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A COMPARATIVE STUDY OF THE HERPETOLOGICAL FAUNAE OF THE ULUGURU AND USAMBARA MOUNTAINS, TANGANYIKA TERRITORY WITH DESCRIPTIONS OF NEW SPECIES

BY

T. BARBOUR AND A. LOVERIDGE

WITH FOUR PLATES

CAMBRIDGE, U. S. A.
Printed for the Museum
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WITH DESCRIPTIONS OF NEW SPECIES

By T. Barbour and A. Loveridge

The material discussed in the following pages was collected between September and December, 1926, by the junior author while on an expedition in the interest of the Museum of Comparative Zoölogy. Both authors have collaborated in a critical examination of the material. When, in the field notes on habits, the singular pronoun is used, it will be understood that it is the collector who is recording.

A selection of the specimens obtained has been presented to the Museum of the University of Michigan, and paratypes of fifteen of the new forms have been sent to the British Museum.

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INTRODUCTION

The object of the expedition was primarily to discover to what extent the little-known fauna of the Uluguru Mountain rain-forest was related to that of the better-known Usambara Mountains. The two ranges are separated from one another by at least a hundred and twenty miles of hot, low-lying country, while the Nguru Mountains form a small connecting-link between.

We consider that the results show a remarkable affinity in the forms inhabiting these ranges, which argues that deforestation accompanied by a lessened rainfall has occurred in the intervening area. Both ranges contain many forms common to the West African forest but this is more noticeably the case with the Usambara Mountains. The Uluguru Mountains on the other hand are shown to support forms (*Chrysochloris* sp. n. and *Scolecomorphus* spp. n.) which link them with the Nyika Plateau of Nyasaland.

The easiest way to demonstrate this relationship is by giving a list of all the known reptiles and amphibians from these mountains. Where numbers are given they represent the number of specimens collected during the 1926 expedition now reported upon. A second table is given showing savannah forms which occur on the lower slopes of the Uluguru Mountain, based on a collection made near Government House, Morogoro, in 1918 by the junior author. Such species are marked with an 'M.' They are almost all widespread forms which do not occur in the rain-forest.

It might be well to take this opportunity to refer to the many records of rare, or West Coast, species credited to Tanga, a coastal port lying between Mombasa and Dar es Salaam and only about fifty miles from Amani and the Usambara Range. Many of O. Neumann's specimens were labelled 'Tanga am Usambara.' To-day the Usambara Mountains are in the political province of Tanga. In German times Sigi (an hour's walk from Amani) was linked with Tanga by railway and it was customary for residents at the coast to spend their vacations, or recuperate, in the mountains; in fact at Mlalo near Ambangula there is a sanitarium. It appears probable that many species purporting to come from Tanga in reality are from the mountains, otherwise it is difficult to understand why species that can live on the coastal plain at Tanga have not spread to Mombasa or Dar es Salaam.

Among the minor objectives of the trip we [1] had set out to secure topotypic material of the six snakes, four lizards, nine chameleons, and nine amphibia which had been described from the Usambara range. We were so far successful that twenty-five of the twenty-eight were collected, each in its own type locality.

The third expectation of the trip was to find new species in the little-known range of the Uluguru Mountains; not only was this hope fulfilled in the case of mammals and birds, but also among the reptiles and amphibia of which the undermentioned genera, species or races are now described for the first time.

[1] The junior author was accompanied by his wife.

Snakes.	*Typhlops uluguruensis* sp. n.
	Prosymna ornatissima sp. n.
	Aparallactus uluguruensis sp. n.
Lizards.	*Hemidactylus persimilis* sp. n.
	Agama mossambica montana sub. sp. n.
	Agama colonorum usambarae sub. sp. n.
	Scelotes uluguruensis sp. n.
Caecilians.	*Scolecomorphus uluguruensis* sp. n.
	Scolecomorphus attenuatus sp. n.
	Boulengerula uluguruensis sp. n.
Frogs.	*Hyperolius mariae* sp. n.
	Megalixalus uluguruensis sp. n.
	Leptopelis parkeri sp. n.
	Leptopelis uluguruensis sp. n.
	Breviceps usambaricus sp. n.
	Hoplophryne uluguruensis gen. et sp. n.
	Hoplophryne rogersi sp. n.
	Parhoplophryne usambaricus gen. et sp. n.

The Following Changes in Nomenclature or in East African Records are Proposed

Typhlops gierrai Mocquard becomes *Typhlops punctatus gierrai* (Mocquard).
Glauconia conjuncta Angel (not of Jan) = *Leptotyphlops distanti* (Boulenger).
Leptodira tornieri Werner becomes *Crotaphopeltis hotamboeia tornieri* (Werner).
Calamelaps polylepis Bocage = *Calamelaps unicolor* Reinhardt.
Elapops modestus Angel (not of Günther) = *Aparallactus concolor* (Fischer).
Elapsoidea nigra Günther = *Elapsoidea guentheri* Bocage.
Gymnodactylus africanus Werner becomes *Paragonatodes africanus* (Werner).
Hemidactylus mabouia (part) Loveridge (not de Jonnès) is *Hemidactylus* sp. n.
Agama colonorum (part) Loveridge (not of Daudin) is *Agama mossambica mossambica* Peters.
Agama cyanogaster Angel (not of Rüppell) = *Agama atricollis* Smith.
Mabuiopsis jeanneli Angel = *Mabuia irregularis* Lönnberg.
Ablepharus massaicnsis Angel = *Ablepharus wahlbergii* (Smith).
Chamaeleo tenius excubitor Barbour becomes *Chamaeleo fischeri excubitor* (Barbour).
Bdellophis vittatus Boulenger becomes *Scolecomorphus vittatus* (Boulenger).
Scolecomorphus kirki (?) of Loveridge (not of Boulenger) is *Scolecomorphus* sp. n.
Boulengerula boulengeri Loveridge (not of Tornier) is *Boulengerula* sp. n.
Rana aberdariensis Angel = *Rana nutti* Boulenger.
Rana merumontana Lönnberg becomes *Rana fasciata merumontana* Lönnberg.
Rana merumontana Loveridge (not of Lönnberg) = *Rana galamensis* Duméril and Bibron.
Maltgania bufonina Boettger is recognised as young of *Rana adspersa* (Duméril and Bibron).
Phrynobatrachus boulengeri De Witte = *Phrynobatrachus acridoides* Cope.
Hylarthroleptis jauenschi Ahl = *Phrynobatrachus acridoides* Cope.
Arthroleptis variabilis Matschie = *Arthroleptis stenodactylus* Pfeffer.
Arthroleptis whytii Boulenger = *Arthroleptis stenodactylus* Pfeffer.
Arthroleptis lönnbergi Nieden = *Arthroleptis stenodactylus* Pfeffer.
Arthroleptis methneri Ahl = *Arthroleptis stenodactylus* Pfeffer.
Arthroleptis brevipes Ahl = *Arthroleptis stenodactylus* Pfeffer.
Arthroleptis wahlbergii Procter and Loveridge (not of Smith) = *juv. Arthroleptis stenodactylus* Pfeffer.
Hylambates vermiculatus Boulenger becomes *Leptopelis vermiculatus* (Boulenger).
Hylambates johnstoni Boulenger becomes *Leptopelis johnstoni* (Boulenger).
Hylambates argenteus Pfeffer = *Hylambates maculatus Duméril.*
Breviceps verrucosus Tornier and Nieden (not of Rapp) is *Breviceps* sp. n.

Material Collected

The four months collecting resulted in 4,039 specimens comprised as follows:

SNAKES

Four hundred and six snakes, referable to thirty-two species, were collected. Nieden (1910) lists seventeen species as occurring at Amani; all of these were taken except *Dendraspis angusticeps*. It need not be supposed that Amani is exceptionally rich in serpent life. A great many species have been recorded from there as a result of the extensive clearing of forest for plantations; moreover, many of the natives engaged on cleaning the plantations are Wanyimwezi whose attitude to snakes is fearless. Owing to the interest shown by Mr. F. N. Rogers, the Custodian of Amani Institute in 1926, his men brought me any snakes they came across during their day's work, so that over a hundred snakes, representing twenty-one species, were obtained there in three weeks.

LIZARDS

Two hundred and sixty-four lizards, referable to twenty-five species, were collected. Nieden (1910) lists seven species as occurring at Amani; all of these with the exception of *Mabuya maculilabris maculilabris* were taken. Fifteen species were collected in the Usambara and sixteen in the Uluguru. Lizards are certainly scarce in these mountains.

CHAMELEONS

Four hundred and twenty chameleons, referable to eight forms, were collected. Chameleons are much more abundant in the Usambara range than they are in the Uluguru Mountains.

CAECILIANS

Two hundred and forty-six caecilians, referable to five species, were collected. Only two species were previously known from Tanganyika Territory, both having been described from the Usambara Mountains. The three new species come from the Uluguru range.

TOADS AND FROGS

Two thousand, seven hundred and three tailless batrachians, referable to fifty species, were collected. Nieden (1910) lists fifteen species as occurring at Amani; all except three were taken there, and seven others not listed by Nieden were also found at Amani.

I. FAUNA OF, OR ON EDGE OF, RAIN-FOREST BETWEEN 3,000 AND 8,000 FT.

(Species marked with an * occur at lower levels also)

SNAKES	Uluguru Mtns.	Usambara Mtns.	References
Typhlops ulugurucnsis sp. n.	4	—	
Typhlops kleebergi	—	×	a
Typhlops punctatus gierrai and intermediates	1	11	b
**Natrix olivaccus*	30	30	
**Boacdon lineatus*	4	17	c
Lycophidion melcagris	2	5	
**Lycophidion capense*	7	5	
Lycophidion scmicinctum	—	×	d
**Mchelya capensis*	—	3	
**Mehclya nyassae*	—	×	e
**Chlorophis neglectus*	15	14	
Chlorophis macrops	—	22	
**Philothamnus semivaricgatus*	1	9	f
**Prosymna ambigua*	M	×	g
Prosymna ornatissima sp. n.	4	—	
Homalosoma lutrix	—	×	h
**Dasypeltis scaber*	1	1	
Geodipsas vaucroccgae	7	11	
Geodipsas proctcrae	2	—	
Crotaphopeltis hotambocia tornieri	25	20	i
**Thelotornis kirtlandii*	2	13	
**Dispholidus typus*	—	7	j
**Calamelaps unicolor*	1	3	
Chilorinophis butlcri	—	×	k
Aparallactus werneri	3	46	
Aparallactus ulugurucnsis sp. n.	3	7	
Elapsoidea guentheri (including *nigra*)	5	42	
Naja melanoleuca	—	×	l
**Causus defillipii*	2	—	
Bitis gabonica	—	4	
Atheris ceratophorus	—	2	
**Atractaspis rostrata*	4	—	
LIZARDS			
Paragonatodes africanus	1	21	
**Hemidactylus mabouia*	2	4	
**Hemidactylus persimilis* sp. n.	1	—	
Lygodactylus fischeri	1	18	m
**Lygodactylus grotei*	1	1	
**Agama mossambica montana* sub. sp. n.	17	23	
Agama colonorum usambarica sub sp. n.	—	14	
**Varanus niloticus*	seen	1	
Lacerta jacksoni	—	×	n
Holaspis guentheri	? seen	2	
**Gerrhosaurus major*	M	×	o
**Mabuya comorensis*	3	28	
**Mabuya varia varia*	11	6	
**Mabuya striata*	1	2	
Siaphos kilimensis	9	4	
Scelotes eggeli	—	21	
Scelotes uluguruensis sp. n.	13	—	
Scelotes tetradactyla	1	—	

	Uluguru Mtns.	Usambara Mtns.	References
Chameleons			
**Chamaeleo dilepis dilepis*	2	3	
Chamaeleo fischeri matschiei	×	80	p
Chamaeleo fischeri multitubereulatus	—	295	
**Chamaeleo deremensis*	2	6	
Chamaeleo melleri	M	×	q
Chamaeleo spinosus	—	1	
Chamaeleo tenuis	×	2	r
Rhampholeon brevieaudatus	12	1	
**Rhampholeon kersteni*	—	×	s
Caecilians			
Scoleeomorphus vittatus	6	5	
Scolceomorphus uluguruensis sp. n.	132	—	
Scolceomorphus attenuatus sp. n.	2	—	
Boulengerula boulengeri	—	58	
Boulengerula uluguruensis sp. n.	43	—	
Toads and Frogs			
**Xenopus laevis*	×	4	t
Bufo brauni	29	35	
Bufo micranotis	1	—	
Nectophrynoides tornieri	134	15	
Nectophrynoides vivipara	166	—	
Rana nutti	53	136	u
Rana fasciata merumontana	—	106	
**Phrynobatrachus krefftii*	—	156	
**Phrynobatrachus ogoensis?*	157	—	
Arthroleptides martiensseni	24	3	
**Arthroleptis stenodactylus*	37	11	
Arthroleptis adolfi-friederici	32	197	
Arthroleptis schubotzi	5	—	
Arthroleptis xenodactylus	22	153	
Arthroleptis minutus	—	19	
Phrynopsis usambarae	—	×	v
Chiromantis rufescens	—	×	w
Hyperolius concolor	1	×	x
Hyperolius mariae sp. n.	—	70	y
**Hyperolius punctieulatus*	×	106	
Hyperolius argus	69	—	
**Megalixalus loveridgii*	22	165	z
Megalixalus uluguruensis sp. n.	16	2	
Leptopelis aubryi	—	11	z1
Leptopelis rufus	20	×	z2
Leptopelis uluguruensis sp. n.	22	—	
Leptopelis parkeri sp. n.	1	—	
Leptopelis vermiculatus	—	1	
Leptopelis johnstoni	4	—	z3
Callulina kreffti	24	26	
Spelaeophryne methneri	8	—	
Breviceps uluguruensis	55	—	
Breviceps rugosus	43	—	
Breviceps usambaricus sp. n.	—	105	z4
Hoplophryne uluguruensis sp. n.	42	—	
Hoplophryne rogersi sp. n.	—	4	
Parhoplophryne usambarieus sp. n.	—	1	

KEY TO REFERENCES OF TABLE I

a. Werner's description in 1904 of the type from Usambara.
b. Matschie's record of *T. eschrichti* and Nieden and Sternfeld's records of *T. punctatus* are probably *punctatus typica* or intermediates.
c. Matschie's record of *Boodon capensis* from Derema.
d. Sternfeld's record of Usambara.
e. Werner's type of *Gonionotophis degrijsi* from Usambara.
f. Matschie's record of *P. neglectus* at Derema and Sternfeld's of *P. thomensis* at Nguelo.
g. Sternfeld's record from Usambara.
h. Sternfeld's record from Amani.
i. First recorded from the Usambara by Werner as *Leptodira rufescens*.
j. Commonly reported by natives as occurring at Nyange in the Uluguru Mountains.
k. Sternfeld's record of Amani.
l. Sternfeld's record of Usambara.
m. Matschie's type of *L. conradti* in 1892, Werner's 1895 record of *L. thomensis* and probably Nieden's 1910 of *L. capensis*.
n. Nieden's record of Usambara.
o. Werner's type of *G. bergi*.
p. Tornier's record of Ukami.
q. Tornier's record of Usambara.
r. Tornier's record of Ukami.
s. Tornier's record of Kerogwe at foot of Usambara Mountains.
t. Loveridge's record of Bagilo, Uluguru Mountains.
u. Nieden's record of Ukami and Amani *Rana delalandii* (= *angolensis*).
v. Ahl's type from the Usambara.
w. Tornier's record of Lewa in Usambara.
x. Matschie has recorded *H. concolor* from Derema; perhaps these are *H. mariae*.
y. Matschie has recorded *H. cinctiventris* from Derema; the determination is a little doubtful.
z. Ukami and Usambara records of *M. fornasinii* and *M. leptosomus* are referable to this species.
z1. Nieden has examined all old German East Africa records of *aubryi* and concludes that they are all *rufus* except those from the Usambara.
z2. Nieden's (1915) records from Amani and Derema.
z3. Reported by Lönnberg from Mombo at foot of the Usambara Range.
z4. Nieden's records of *B. verrucosus* from Magrotto in Usambara.

II. SAVANNAH OR OPEN FOREST FAUNA OCCURRING UP TO 3,000 FT.

(For species common to rain-forest also see those in Table I marked with an *)

Snakes	*Morogoro etc.	Amani etc.	References to Amani column
Typhlops mandensis	M	—	
Typhlops punctatus punctatus	—	×	a
Typhlops mucruso	M	×	b
Typhlops lumbriciformis	—	×	c
Typhlops unitaeniatus	—	×	d
Leptotyphlops distanti	M	—	
Python sebae	M	×	e
Tarbophis semiannulatus	M	?	f
Crotaphopeltis hotamboeia hotamboeia	1	1	g
Amplorhinus nototoenia	M	—	
Rhamphiophis oxyrhynchus	M	×	h
Psammophis sibilans	M	×	i
Psammophis subtaeniatus	M	×	j
Naja nigricollis	M	×	k
Dendraspis angusticeps	M	×	l
Bitis arietans	M	×	m
Lizards			
Hemidactylus squamulatus	M	—	
Hemidactylus ruspolii	M	—	
Hemidactylus brooki	M	×	n
Lygodactylus picturatus picturatus	2	×	o
Zonurus tropidosternum	M	—	
Latastia johnstoni	M	—	
Gastropholis vittata	?	×	p
Eremias spekii spekii	M	1	
Gerrhosaurus flavigularis flavigularis	M	—	
Mabuya maculilabris maculilabris	1	×	q
Mabuya megalura	—	1	
Riopa sundevallii	M	1	
Ablepharus wahlbergii	M	—	
Melanoseps ater longicauda	1	×	r
Toads and Frogs			
Xenopus mülleri	?	×	s
Bufo regularis	3	3	
Rana oxyrhynchus	M	1	
Hyperolius fulvovittatus	11	17	
Hyperolius nierops	—	2	
Breviceps mossambicus	3	×	t
Phrynomerus bifasciata	?	×	u
Hemisus marmoratus	M	—	

* An 'M' in the Morogoro column implies the species has been collected there by Loveridge.

KEY TO REFERENCES OF TABLE II

a. Nieden and Sternfeld's records, see 'b' of Table I.
b. Sternfeld's record from Tanga. It may be remarked that the colouring of *T. p. gierrai* is almost the same as *T. mucruso.*
c. Werner's type of *T. kleebergi* from Usambara is treated as specifically distinct (see Table I) so that it is doubtful if this species has actually been taken in the mountains.
d. Sternfeld's record from Bukuri in Usambara. Werner also.
e. Occurs at Sigi below Amani.
f. ? Werner's record of *Dipsas obtusa* Gmelin in 1895.
g. Werner's record of *Leptodira rufescens* is *C. h. tornieri.*
h. Sternfeld's record of Tanga.
i. *Psammophis regularis* Sternfeld has since been recorded by Sternfeld from Amani; if he is correct in this, undoubtedly *regularis*, which was described from the Cameroons, is merely a fortuitous variation of *sibilans.* Under any circumstances it is difficult to imagine a *Psammophis* occurring at Amani; perhaps it came from Sigi.
j. Sternfeld's record of Usambara.
k. Two in the collection of the Amani Institute are without locality but the species occurs at Sigi.
l. Nieden's record of Amani.
m. Sternfeld's record of Usambara. There is a specimen in Amani Institute from Sigi.
n. Tornier's record from Derema.
o. Tornier's record of Majamboni in Usambara.
p. Werner's type of *G. prasina.*
q. Nieden's record of Amani.
r. Tornier's type from Kerogwe at the foot of the Usambara Mountains.
s. Undoubtedly the species occurs at Morogoro. Nieden has recorded it from Usambara.
t. Tornier's records from Magila and Rubugwe in Usambara.
u. Undoubtedly the species occurs at Morogoro. Nieden has recorded it from Usambara.

SUMMARY

Snakes.	34 species known from the Uluguru and 39 from the Usambara Range; of these 26 are common to both.
Lizards.	27 species occur in the Uluguru and 23 in the Usambara Range; of these 18 are common to both.
Chameleons.	6 forms are known from the Uluguru and 9 from the Usambara Range; 6 are common to both.
Caecilians.	4 forms occur in the Uluguru and 2 in the Usambara Range; only one is common to both.
Frogs and Toads.	33 species are known from the Uluguru and 32 from the Usambara Range; about 20 are common to both.

ITINERARY AND LIST OF COLLECTING STATIONS

BAGILO. Camped on a little knoll near the first huts of Bagilo 'Village' on the Morogoro-Bagilo path. Very little was collected in the vicinity, most of such work being done in the rain-forest a mile or more from Bagilo on the track to Morogoro. The forest floor was covered with leaf mould and proved a favourite haunt of Breviceps and Bufo, while guerezas and squirrels lived in the tree-tops. These lichen-laden trees are so tall that they must be seen before their stupendous size can be appreciated; their big limbs support masses of ferns, while lianas and other tropical epiphytes depend from them like ropes; these are much used by the squirrels.

A broad river flows through the forest in the valley bottom, becoming a rushing, rock-studded torrent in the open. Here Arthroleptides occurs in suitable spots. The river is fed by tributary streams so choked with fallen trees and smothered in vegetation that following their courses was difficult. Along their banks grew the wild banana plants beloved by Callulina and Leptopelis.

Above the camp was another much drier patch of forest that was unproductive except for birds. Across to the west, in damp forest intersected by many moist ravines, Nectophrynoides and Arthroleptis were procured. Curiously enough it was the only patch of forest in the vicinity where one could count on obtaining these genera; elsewhere their occurrence was fortuitous. Here also, in open glades not far distant from a magnificent, forest-girt waterfall, Crotaphopeltis and Scelotes were discovered beneath fallen logs.

NYANGE. The camp site was one of necessity rather than of choice, for I was conducted to it one rainy morning by the chief, who had already caused huts to be erected for my native personnel. It was an ideal camp site but, being situated in the valley, and to a great extent surrounded by the maize plantations of the villagers, it involved long tramps daily to the forests which capped the surrounding hills. Mammal collecting was disappointing in the extreme, but birds were abundant in the forested hills to the east.

It rained nearly every day that I was at Nyange and in consequence the natives were kept busy weeding their plots. In many places these clearings abutted on the forest, or were even on ground quite recently covered by forest, of which smouldering logs and stumps were all that remained. As the parents weeded, the children gathered the grass and uprooted vegetation into heaps which were left scattered about on the somewhat bare ground, for the maize was little more than a foot high in most of the cultivated areas.

The Nyange children took four days to appreciate the advantage of a market for snakes, but when they at last understood that fifty cents (= 12 cents U. S. A. currency) would be paid for each one, they lost no more time but brought in nearly a hundred in a week. I shall never forget the Nyange kiddies bringing in their catches in old whisky bottles with maize-cob stoppers, or their peals of laughter as I shook out the snakes, or as they went racing down the path to turn over more heaps or logs; for it was in such situations that they found them. I have to thank the Nyange boys for the only three new snakes taken during the trip, a *Typhlops*, *Prosymna*, and *Aparallactus*.

Agamas occurred on the rocks along the banks of the stream; the only really abundant lizard was *Mabuya varia varia*. The reptile fauna of the valley reflected the conditions, for it was such as might be found at Morogoro at the foot of the mountains.

Caecilians were also obtained in the gardens, but salientia, with the single exception of *Phrynobatrachus ogoensis*, were very scarce. A great effort had to be made to secure even the small series of *Spelacophryne methneri*, while those of the new genus *Hoplophryne* were not obtained in the valley but in a moist ravine on a mountain top many miles away.

Mkarazi. A broad shallow river frequented by cormorants and *Varanus niloticus* flows in the valley. On either side of it is a remnant of forest and another patch occurs on the top of a hill to the east of the road. This forest is very dry and there are no guerezas in it. Blue monkey, lemur, Peter's elephant-shrew, Nandi cat, and hyrax, however, are to be found, and I imagine that before the deforestation of the surrounding country took place this was probably rain-forest. Trumpeter hornbills and guinea-fowl were collected but the avifauna was essentially similar to that at Morogoro. *Scelotes tetradaetyla* occurs alongside *siaphos kilimensis*. The new *Boulengerula uluguruensis*, and *Spelaeophryne methneri*, were also found in a damp spot beneath a large log; apart from these creatures the fauna was uninteresting.

Mkangazi. A forced halting place on the uphill climb to Nyingwa. The country is largely under cultivation with the exception of one or two small clumps of trees; there is no trace of forest, the massive rounded mountains being covered with dry stubble or native potato plants. I arrived at 1 P.M., and the rain descending at 3 P.M. continued till far into the night. Left at daybreak. Two days before passing the place on my return journey I sent word to the chief that I would halt for two hours and buy anything that the small boys would bring in except certain species which I enumerated. *Rhynchocyon*

petersi, *Sarothrura rufa elizabethae*, and *Bufo micranotis* were the only rarities so obtained.

Tawa. A low-lying village in hot cultivated country. Halted for two hours to give the porters a rest and allow stragglers to catch up. Some children brought a few Megalixalus and Hyperolius. With this exception, though warned in advance two days before, the people had caught nothing. While lunch was being prepared I did some collecting in the vicinity.

Nyingwa. For some reason best known to himself the petty chief at Nyange pictured Nyingwa as a naturalist's Eldorado 'and it was only a day's march.' The chief was old but he must have been very active on the day that he accomplished it and he certainly did not carry a porter's load. It took us three days, for it involved a climb of 5,000 feet and the going for the last two miles was very hard on the porters.

The foot of the mountain is well cultivated and contains many small banana plantations in which great numbers of *Hyperolius argus* occur. As we climbed up, first Jumbe Saidi and then his father Jumbe Chibi urged us to camp, but I insisted on being conducted up an hour's walk beyond the last huts, till we found a suitable clearing on the edge of the forest. There was a great deal of bamboo growing in the forest, and as a token of altitude we had a few giant groundsel below the camp — these groundsel were ten or twelve feet high!

The camp site was mainly selected on account of the croaking or calling of frogs in the vicinity. It proved rich collecting for amphibia but not a snake or a lizard was seen during the whole week; some lizard eggs were the only sign of the existence of reptiles at this altitude though some open spaces seemed ideal for Mabuya. Why Nyingwa should be lacking in reptiles when they occur at greater heights on other mountains, remains to be explained.

Abbott's Duiker dwells in the forest but is rare; the Mountain Duiker is common, but wary through much hunting. The forest is rich in bird-life and several species which were unknown to me were secured. Noteworthy among the amphibians was the occurrence of two species of Scolecomorphus as well as Nectophrynoides and Breviceps. These were the dominant forms, the last two being associated with the bamboos.

Vituri. When at Nyange, news was brought to me of Anomalurus at a place called Vituri some three hours north of our camp. The path wound up one mountain and down another through forest all the way. It was exceedingly

difficult walking — or climbing — for the porters, but, travelling unhampered with a single attendant gun boy, I accomplished the journey in about two hours. The scattered huts of Vituri mark the northern limits of the rain-forest and, as one emerges from the latter, there is a perfect view across the shimmering plains to Nguru Mountain, which forms a link between the Uluguru and Usambara ranges.

Vituri forest was comparatively dry at the time of our visit, and collecting was disappointing till I found a deep and moist ravine with wild bananas growing on its slopes. In these bananas were obtained Megalixalus, Hyperolius, Nectophryne and a fine series of Leptopelis, two of the three species being new.

The snake and lizard fauna differed but little from that of Morogoro except that it contained a few more mountain forms and lacked a good many plains species. *Siaphos kilimensis*, a new Scelotes and *Melanoseps ater longicauda* were found.

Below the camp the mountains sloped away very abruptly to the plains below. Half an hour after leaving camp one entered upon a reddish soil like that of Kilosa together with its typical flora, maiombo bush, and the old familiar fauna of common things associated with it.

Tumvi. This marked the foot of the mountains and was about the same altitude as Morogoro. It seemed strange to see the larger *Agama mossambica mossambica* on the tree-trunks in place of *Agama m. montana* subsp. n., *Eremias spekii* running about the paths once more and *Mabuya striata* plentiful again. No halt was made, but half-a-dozen species of lizards were seen in a mile, while in the mountains scarcely as many could be found in a day, even when they were searched for.

Dar es Salaam. While we awaited the arrival of Mrs. Loveridge from England, collecting was carried on in a swamp to the south of the town, and very near the ocean. Here was found the very rare *Hyperolius microps* discovered by Livingstone in Rovuma Bay farther south. The other amphibia and reptiles were typical of the coastal plains.

Amani. This place is world-famous for its Agricultural Research Institute and Arboretum. The Institute is at an altitude of 3,000 feet, yet, as it is only fifty miles from the sea as the crow flies, it appears to be as cool as 5,000 feet in the Uluguru Mountains. Climatically the different levels are rather confusing. A week before our arrival eight inches of rain had fallen in twenty-

four hours, being the heaviest deluge recorded since 1905. Its effects were shown in the landslides and washaways which blocked the road.

At the foot of the mountain (Sigi, possibly 1,000 feet) palms have been assembled from every tropic clime, and as one ascends, the place is planted with acres of various trees from each of the five continents. Every species is represented by well-labelled groves, not single trees, and the winding drives are kept in beautiful condition. As one ascends to Mt. Bomoli (above the Institute) fir and pine forests replace the blue gums, while heather covers the open spaces about the rocky outcrops.

The house which we occupied at Amani was in the grounds of the arboretum, yet close to the virgin forest; it was along the well-made paths of the latter that most of our collecting was done. The forest defies description; the trees are of immense height, and consequently arboreal animals — guerezas, blue monkeys, squirrels — find safe refuge and are numerous. Of squirrels three genera were collected in one day. Forest birds are everywhere, perhaps the most notable, either for their beauty or their calls, being *Turacus fischeri* and *Heterotrogon vittatum vittatum*.

Tree-planted hillsides, free from undergrowth but strewn with dead leaves beneath which small Arthroleptis find a moist retreat, rotting logs with sodden interiors, marshy bottoms, and rank sedges in some ravines, swift streams flowing through well-kept pastures in others — these are but a few of the great variety of habitats which Amani has to offer small creatures. The streams emerge from the wooded valleys but arboreal frogs are scarce — or were so at the time of our visit. *Hylambates vermiculatus* was obtained only after an infinity of trouble. *Callulina kreffti* was not uncommon but the only really abundant species were *Breviceps usambaricus* sp. n., *Phrynobatrachus krefftii* in a certain stream in the forest, and *Rana nulti* where the same stream flowed through cleared lands.

The arboreal lizards were the more interesting, *Paragonatodes africanus* occurring in the forest, and *Holaspis guentheri* on the outskirts, but very rare. *Mabuya comorensis* is the common skink of the forest paths. Chameleons of seven species were collected, and twenty-one species of snakes also, of which twenty were secured in nineteen days. Most of these were caught by natives engaged in cleaning the plantations. Arboreal, terrestrial, and burrowing vipers (*Atheris ceratophorus, Bitis gabonica, Atractaspis rostrata*) were present but the only really common venomous snake was *Elapsoidea guentheri*.

Derema. Very near to Amani, the boundary being a small stream. Derema is somewhat lower. A large swamp, caused by the damming back of a stream flowing down the valley to the saw mill, is bordered by sedges in which Megalixalus and several species of Hyperolius find a refuge. Forest is present on the surrounding hills which have not been cleared for coffee planting, and supports a fauna similar to that of Amani. Chamcleons are abundant on the coffee trees, where they perform useful work in capturing insects.

Misalae. Little collecting was done at this spot. We arrived at 11.30 p.m. in pouring rain and would have left at dawn but for the difficulty of obtaining porters. The camping place was on land long since cleared of forest and now devoted to native gardens. Outcrops of rocks provided basking places for *Mabuya varia varia;* and *Agama mossambica montana* occurred on the trunks of the few trees left standing in the gardens.

Kizerui. A day was spent here, as the previous day's march had been in driving rain most of the way and only the clothes we stood up in were not soaked. The forest here is magnificent but the natives are accomplished poachers, with game fences and pits scattered through the bush, so that animals are not very abundant. We devoted our attention to amphibia, there being little sunshine to tempt reptiles from their retreats. A *Bitis gabonica* was brought in and the chief assured me that *B. arietans* occurs on the hillsides some distance below. From bush and grass country in the vicinity we also received a tree viper (*A. ceratophorus*). The most interesting lizards found were *Paragonatodes africanus* and *Siaphos kilimensis;* while in the few wild, and more numerous domestic bananas, Nectophrynoides, Callulina, and *Hyperolius fulvovittatus* occurred. Conditions reminded one of those at Nyange in the Uluguru range.

Kizara. We halted for breakfast in the well-populated valley, which seemed very hot after the deliciously cool rain-forest through which we had come while crossing the mountains separating Kizerui from Kizara. Owing to the steepness of these peaks, the chief at Kizerui had furnished us with double the number of porters requested. The Kizara chief and his men, informed a week beforehand of our arrival, met us in the mountains a mile and a half above the village. After the usual greetings a hundred of them formed into a singing, drum-beating procession and so escorted us to the rest-camp, passing several bands of hand-clapping women on the way. To offset this royal welcome they

had only a boomslang and a couple of chameleons to show us; so, the day being young, we breakfasted at the mission and pushed on and up to the mountains again.

Mt. Lutindi. This was selected as being one of the highest spots in the Eastern Usambaras. It is at the very edge of the broad, hot valley which divides the eastern from the western ranges. Collecting was disappointing, as the forest was very dry and the boulder-strewn, wind-swept summit of the mountain was covered with short grass and heather-like vegetation wherever the shallowness of the soil permitted its survival. On two aspects the mountain side is precipitous, with a sheer drop of a thousand feet to the valley below. The fauna is that of Amani but poorly represented by a few examples of a few species. The only amphibian of outstanding interest taken was *Leptopelis aubryi* and its young.

Bumbuli. Situated in the Western Usambaras, Bumbuli is separated from Mt. Lutindi in the Eastern by a broad sandy valley inhabited by the savannah fauna of widely spread species. The Western Usambaras differed from the Eastern in the greater extent to which deforestation had been carried. Much of the country through which we passed on the way here was clothed with short grass on which the flocks and herds of the villagers were grazing.

The spot at which we stayed at Bumbuli was in a warm valley just below a mountain whose lower slopes were planted with bananas. The summit was clothed with what should have been rain-forest but at the time of our visit was very dry, yet remnants of a rain-forest fauna were still present; among the birds trumpeter hornbills and plantain-eaters were conspicuous. *Paragonatodes africanus*, *Siaphos kilimensis*, *Bufo brauni*, and numerous other rain-forest species occurred among the reptiles and batrachians.

Phillipshof. Camp was made on the site which had been selected by the Field Museum Expedition a couple of months previously: rolling downs of grazing land, marshy swamps and slow-flowing streams in the bottoms, scattered patches of rain-forest on the uplands, with vast stretches of forest nearby on either side of the Malindi road. Mammals and birds were numerous in this forest, but reptiles, with the exception of chameleons, were remarkably scarce; in fact I caught only one snake (*Chlorophis neglectus*) during the fortnight we spent at Phillipshof. It is the type locality of *Chamaeleo fischeri multituberculatus*, of which a long series was secured in the hope of discovering the range

of variation and exactly how many races occurred in the Usambara Mountains. Some interesting observations on the egg-laying habits of *Lygodactylus fischeri* were made. The amphibia presented little of interest apart from the finding of Lönnberg's *Rana merumontana*, thus establishing another record demonstrating the homogeneity of the fauna of the East African mountains.

APPROXIMATE ALTITUDES OF COLLECTING LOCALITIES *

Uluguru Mountains		Usambara Mountains	
Bagilo	5,000 ft.	Amani	3,000 ft.
Mkangazi	3,000	Bumbuli	2,000
Mkarazi	1,500	Kizara	3,000
Nyange	2,500	Kizerui	4,000
Nyingwa	7,500	Lushoto	5,000
Simbini	3,000	Misalae	3,000
Tawa	1,000	Mt. Lutindi	4,000
Vituri	2,000	Phillipshof	5,500
		Sigi	1,000
		Soni	2,000

* We should like to thank Mr. H. P. Rowe, Deputy Director of Tanganyika Surveys, for assistance in estimating some of these altitudes. Also Dr. Sandground for identifying the helminthological material, and the artists, Miss H. M. Saunders, Miss O. Otis and Mr. J. Henry Blake, for their excellent drawings.

SYSTEMATIC LIST OF SPECIES COLLECTED

TESTUDINIDAE

Pelusios nigricans castaneus (Schweigger)

Emys castanea Schweigger, 1814, 'Prodr. Chelon.,' p. 45.

A small water tortoise was brought to me by two boys, who said that they had picked it up on the road about ten miles south of Nyange, Uluguru Mountains. I could obtain no other information as to the occurrence of tortoises in these mountains beyond Salimu's[1] statement that they are found from time to time but are nowhere common. The word *kikui* is employed by the Wakami for all species of tortoises.

TYPHLOPIDAE

Typhlops uluguruensis sp. n.

4 (M. C. Z. 23080–3) Nyange, Uluguru Mtns., 6–11. x. 26.

Type. No. 23080. Museum of Comparative Zoölogy. Sex ♂. From Nyange, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 6th, 1926.

Paratypes. Nos. 23081, 23082, 23083.

Affinities. Apparently most nearly related to *Typhlops kleebergi* Werner and *T. gracilis* Sternfeld, though in some respects not unlike *T. pallidus* (Cope).

Werner described *T. kleebergi* from the Usambara Mtns. in 1904. Sternfeld omitted it from his list of the snakes of German East Africa published in 1910. In 1915 Boulenger placed it in the synonymy of *T. lumbriciformis* (Peters). Unless inaccurately described, however, it is a valid species related to *T. gracilis* and differing from *T. lumbriciformis* in lacking a subocular and in that the diameter of its body is contained in its length 36 instead of 60 times. The relation of these three mountain-inhabiting East African snakes can best be shown by the following table:

T. gracilis	*T. uluguruensis*	*T. kleebergi*	*T. lumbriciformis*
Scale-rows 22	20	18	18
Body-diameter contained 80 times in the length	50	36	60
Nasal divided from 2nd labial to rostral	Nasal divided from 1st labial to rostral	Nasal semidivided	?
Subocular absent	absent	absent	Large subocular

In a letter recently received from Dr. Werner he informs us that he cannot agree with Dr. Boulenger's action in placing *T. kleebergi* in the synonymy of *T. lumbriciformis.*

[1] Salimu bin Asumani, an Mkami collector frequently referred to in these pages.

Diagnosis. Differs from all East African members of the genus, except *gracilis*, in lacking a praeocular and subocular. It differs from *gracilis* in its rounded instead of sharply horizontal-edged snout, 20 scale-rows instead of 22, and less slender proportions, for the diameter of its body goes into the total length 50 instead of 80 times.

Description. Snout prominent, rounded, with scarcely inferior nostrils. Rostral very large, extending backwards to an imaginary line connecting the commisures of the mouth; eye indistinguishable (in one of the paratypes a little pink pigmentation indicates its position); nasal divided, the suture extending from the second labial through the nostril to the rostral; no praeocular or subocular; ocular scarcely half the size of the huge nasal, in contact with the third and fourth upper labials; a small postocular; four upper labials; three lower labials. Diameter of body contained 50 times in the total length (48 to 51 in the paratype series); tail longer than broad (in paratype No. 23081 it is as long as broad), sharply pointed but not terminating in a spine; 20 scales round mid-body.

Coloration. Uniformly flesh-pink in life; colourless or straw-coloured in alcohol.

Measurements.[1]

Type	Length of head and body, 235 mm.
	Length of tail, 5 mm.
	Diameter at mid-body, 4.5 mm.
Paratypes	Total lengths, 245, 240, 230 mm.
	Tail lengths, 3, 4, 4 mm.
	Diameters at mid-body, 5, 5, 4.5 mm.

Diet. Only one snake was opened up for examination. The stomach contained many termites and the intestine was full of undigested heads.

Habitat. Two, at least, of the series were taken under the rotting grass roof of a collapsed hut which had been built close to the edge of the rain-forest. Such huts are always teeming with termites.

Typhlops braminus (Daudin)

Eryx braminus Daudin, 1803, Hist. Nat. Rept., **7**, p. 279.

1 (M. C. Z. 24008) Dar es Salaam, 4. xi. 26.

Variation. Normal number of twenty mid-body scale rows.

Coloration. Plumbeous black, not brown.

Enemies. Recovered from the stomach of a burrowing viper (*Atractaspis rostrata*) in the Botanical Gardens. The head to mid-body is in a fine state of preservation; the latter half of the body was entirely digested away.

[1] All measurements are in millimeters.

Typhlops punctatus punctatus (Leach)

Acontias punctatus Leach, 1819, in Bowdich, 'Miss. Ashantee,' p. 493.

1 (M. C. Z. 23092) Dar es Salaam, 9. xi. 26.

In a previous paper [1] the junior author drew attention to two other specimens from this locality with which this example agrees in colouring and other peculiarities. It has 32 scale-rows instead of 30, which is maximum for *punctatus*, and the body diameter is included in the length 38 times instead of 30. Its length is 300 mm., and the mid-body diameter 8 mm. More material may demonstrate an East Coast race with slenderer body. In some respects it resembles *T. tettensis;* but the position of its eye, which is clearly beneath the ocular scale, is unlike *tettensis, mossambicus* or *trilobus* as figured by Peters.

Typhlops intermediate between punctatus and gierrai

1 (M. C. Z. 23093) Amani, Usambara Mtns., xii. 1926.

This very interesting snake is coloured like those specimens of *gierrai* marked (iv) below, and it is undoubtedly the same species; yet it lacks the small scale between the praeocular and supralabials, and its body diameter is included 30 times in the total length. It has 28 mid-body scale-rows. In the collection of the Amani Institute are three similar examples from the Monga path which I provisionally referred to *T. punctatus*. Under the circumstances, we consider that the close relationship between *gierrai* and *punctatus* is best expressed by making *gierrai* a race of the widely distributed *punctatus*. It is apparently a perfectly valid mountain form.

Typhlops punctatus gierrai (Mocquard)

Typhlops gierrai Mocquard, 1897, Bull. Mus. Paris, p. 122 (Tanga).

1 (M. C. Z. 23084) Bagilo, Uluguru Mtns., 27. ix. 26.
6 (M. C. Z. 23085–90) Amani, Usambara Mtns., 20–27. xi. 26.
1 (M. C. Z. 23091) Mt. Lutindi, Usambara Mtns., 10. xii. 26.
3 (M. C. Z. 23473) Mlalo near Ambangula, Usambara Mtns., xii. 26.

Nyoka midomo miwili (Kikami and Kiswahili); *mkonko* (Kisumbara).

Variation. This series is of considerable interest as *gierrai* has hitherto only been known from the holotype. Our specimens all agree in the possession of a small scale resting on the second and third upper labials. This, together with the formula of body diameter into length (31 to 50 times in *gierrai;* 24 to 30 times in *punctatus*), is the only characteristic which serves to distinguish it from *punctatus*. Possibly the eye is more distinct in *punctatus;* it appears so from the series at our disposal.

[1] Loveridge, 1923, Proc. Zoöl. Soc. Lond., p. 872.

While eight specimens agree with the type in having 28 scale-rows, three of the Amani snakes have only 26. The body diameter of the type was contained 50 times in its total length, while in the present series it ranges from 31 to 43 times. There seems to be little or no sexual variation in the breadth of the tail as compared with its length; perhaps it will be found that a ratio can be established by dividing the length of tail into the body length. We suggest that in males it goes from 55 to 60 times and in females 75 to 79 times, but, being unable to sex all the specimens with precision, we hesitate to say that this is definitely the case.

The reasons for considering *gierrai* a subspecies of *punctatus* are given above.

Colouring. Four distinct types of coloration occur. These enable us to trace the gradation between the extremes.

(i) Bagilo. Above, uniformly blue-black except for a minute light spot on the base of each scale. Below, uniformly white in life, yellowish in alcohol.

(ii) Amani. Above, like (i) except that the blue-grey spot on each scale is large, giving the snake a somewhat striped appearance. This colouring is identical with that of the specimen of *punctatus* from Dar es Salaam recorded above, also with an example of *punctatus* from Liberia. Below, uniformly white.

(iii) Amani. In one young snake the light blue-grey spot eliminates the blue-black colouring of the scale except from the lateral edges. This results in the snake having ten well-defined, dark dorsal and lateral lines. Below, uniformly white.

(iv) Amani. A very large snake. Above, pale grey, each scale with lateral black edges, excepting some which are involved in large irregular patches of black. The black scales which go to form the patches have each a light speck at their base which is only visible with a lens. Below, uniformly white. This specimen agrees with the type of *T. gierrai* and closely matches examples of *T. punctatus* from the Cameroon which we consider referable to the colour variety represented by the 'species' *congestus* Duméril and Bibron.

(v) Mt. Lutindi. A still larger individual about to slough. Uniformly opaque white, but with the colouring of (iv) faintly discernible on close examination; more readily seen in alcohol than when alive.

Measurements. The Bagilo snake, measuring 390 (385 + 5) mm. in length and 9 mm. in diameter, was slightly larger than the Mt. Lutindi example, which was

380 (375 + 5) mm., but had a greater body diameter, viz. 12 mm. Both are smaller than the 469 mm. type.

Habitat. My wife called my attention to the Lutindi snake, which was lying in a neatly moulded cavity beneath a large rotten log in the forest. It had heavy deposits of fat and was evidently resting there until such time as it could slough. Most of the Amani specimens were taken inside damp and very rotten logs on Mt. Bomoli, but a few were taken beneath the logs. The Bagilo reptile was turned up by a native who was engaged in hoeing over his garden which abutted on the rain-forest.

Folklore. The Wasumbara natives say that the *mkonko* is the 'cow' of the soldier ants (*Dorylus nigricans subsp.*) which are very abundant in these mountains. When I asked what they meant by this they replied that sometimes when one encountered these fierce marauders on the march, one might see a Typhlops wriggling along with the column of ants protected by the warrior ants and in no way molested by any of them. I found the story very widespread but mainly based on hearsay: only one or two natives claimed to have seen the phenomenon themselves. One European, however, told me that he had seen such a procession at Amani about three years before. I examined about fifty-four columns of *siafu*, as these ants are locally called, during the following five weeks without seeing a single Typhlops. If the story is true, and I see no reason to doubt it, the reason for the strange association should provide an interesting subject for study, as these soldier ants are notorious for attacking almost every living thing which comes within reach of their jaws. The native's explanation, purely theoretical of course, is that the ants keep their 'cow' until there is a food shortage, when they kill it. I took particular pains to ascertain that the creature referred to was a Typhlops and not a caecilian. Of course, the species of Typhlops the world over are prone to feed on termites or ants and their integument is modified so as to afford protection against insects' jaws or stings.

Typhlops mucruso (Peters)

Onychocephalus mucruso Peters, 1854, Monatsber. Akad. Berlin, p. 61.

1 (M. C. Z. 23093) Kilosa, ix. 26.

We are indebted to Mr. N. C. Miller of the Game Department for this specimen.

Variation. In examining this snake the opportunity was taken to see if East African specimens can be separated into two races (*mucruso typica* and *m. humbo*), on the basis of the eye being beneath the suture between praeocular and ocular

(*humbo*) or clearly in the ocular (*mucruso*). Out of six Kilosa snakes in the collection of the Museum of Comparative Zoölogy, three have the eye in the ocular and three beneath the suture. Of four from Morogoro (three loaned by the United States National Museum, Nos. 62891–3) two are in the ocular and two beneath the suture, thus confirming Boulenger's opinion that the forms are not separable. Nor has its position anything to do with age as judged by length.

Two of the characters used by Miss Procter[1] to differentiate *T. excentricus* from *T. mucruso* cannot be considered of use, for the nasals meet behind the rostral in all four Morogoro snakes, are just in contact in four of the Kilosa snakes and are separated in the other two. The diameter is included in the length from 22 to 34 times in these ten snakes; 25 to 37 times has been the recognized range hitherto. The scale-rows are 30 to 36, which is within the range of the species.

LEPTOTYPHLOPIDAE

[Leptotyphlops distanti (Boulenger)][2]

Glauconia distanti Boulenger, 1892, in Distant, 'Naturalist in the Transvaal,' p. 175, fig.
Glauconia conjuncta Angel (not of Jan.), 1925, Reptiles et Batraciens, in 'Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912),' p. 31.

One of the two specimens was examined in Paris by the junior author through the courtesy of M. Angel. The diameter of body was contained in the total length 45 times, and the length of tail between 9 and 10 times. The colour of this specimen was unusual, being brown above and paler beneath. The second and larger specimen was of the usual jet-black type.

COLUBRIDAE

Natrix olivaceus (Peters)

Coronella olivacca Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 622.

1 (M. C. Z. 23094) Bagilo, Uluguru Mtns. 28. ix. 26.
24 (M. C. Z. 23096–23118) Nyange, Uluguru Mtns. 6–11. x. 26.
1 (M. C. Z. 23095) Mkangazi, Uluguru Mtns. 12. x. 26.
3 (M. C. Z. 23119–30–31) Nyingwa, Uluguru Mtns. 16–19. x. 26.
1 (M. C. Z. 23132) Vituri, Uluguru Mtns. 28. x. 26.
3 (M. C. Z. 23133–5) Dar es Salaam, 4. xi. 26.
29 (M. C. Z. 23136–23159) Amani, Usambara Mtns. xi–xii. 26.
1 (M. C. Z. 23160) Bumbuli, Usambara Mtns. 7. xii. 26.

Variation. This series of sixty-three snakes was collected in the hope that it would throw some light on the variation in the scale-rows. These specimens

[1] Procter, 1922; Ann. Mag. Nat. Hist., 9, 685.

[2] When brackets are placed around a species and its author it denotes that the species in question was not collected during the expedition, but it has been found necessary to refer to it for some reason or other.

effectually show that there is something in the suggestion made by the junior author[1] that there may be a transcontinental reduction in their numbers from west to east. While for forty years 19 has been considered the invariable number for this species, in reality 17 is the more usual number in East Africa, at least for mountain snakes, and 15 occurs on Pemba Id. No fewer than 56 of these 63 snakes have 17 mid-body scale-rows or even less. In counting the rows on the neck, mid-body and praeanal region, one finds almost every possible variation:

1	specimen	with	20, 17, 16	3	specimens	with	19, 17, 15
4	"	"	19, 19, 17	1	"	"	19, 16, 16
1	"	"	19, 19, 16	1	"	"	18, 19, 17
1	"	"	19, 18, 17	1	"	"	18, 17, 17
39	"	"	19, 17, 17	1	"	"	18, 17, 16
8	"	"	19, 17, 16	1	"	"	17, 17, 16

By taking the neck count just behind the parietals one may often find 21 rows, but as the scales are somewhat irregular so close to the head, the counts were made at a point about opposite the fifth ventral scute.

The ventrals range from 130 to 140 with an average of 135; the anal is invariably divided; subcaudals range from 63 to 87.

For purposes of comparison nine specimens from Stanleyville and the Ituri Forest, Belgian Congo, in the collection of the American Museum of Natural History were counted, and all but one had 21, 19, 17 scale-rows; the one exception had 19, 19, 17. Some had only one or two rows of 21 scales very close to the back of head. Four other specimens in the United States National Museum from Leopoldville, Belgian Congo, Kenya Colony, and Morogoro, Tanganyika Territory, agreed in having 19–21, 19, 17 scale-rows. We wish to express our thanks to the curators concerned for the facilities afforded for examination of these specimens.

Coloration. In life a Bagilo female had the ventrals coloured a bright mauve. In Nyange snakes the variation was astonishing, the lateral edges of the ventrals being red, olive, grey, or pale blue. In one specimen the ventrals were bright yellow with grey edges. Some of the young have a black band three scales wide behind, and impinging on, the posterior border of the parietals; this band is followed by an incomplete yellow one two scales wide, interrupted on the vertebral line.

Measurements. The largest male (Nyingwa) measured 430 (300 + 130) mm., and the largest female (Nyange) 488 (350 + 138); the smallest snake, a male (Nyange) taken on 7. x. 26., measured 193 (138 + 55). These mountain exam-

[1] Loveridge, 1925, Proc. Zoöl. Soc. Lond., p. 71.

ples of *N. olivaceus* will probably be found to average considerably less than specimens from other parts of Africa.

Breeding. A Nyange female had very slightly developed eggs measuring 5 mm. in diameter on 8. x. 26. Another Nyange snake held two eggs measuring 12 × 6 mm. on 9. x. 26.; an Amani female, four eggs measuring 20 × 8 mm. on 19. xi. 26.; another, four eggs 16 × 7 mm. on 25. xi. 26.; and yet another, eggs measuring 21 × 8 mm. on 29. xi. 26. At the same time the rest of the large series of females, with but few exceptions, held undeveloped ova.

Diet. Stomach contents of Nyange snakes. (i) *Arthroleptis stenodactylus.* (ii) *A. stenodactylus.* (iii) Eight small frog's eggs. (iv) Three round, white eggs measuring 4.5 mm. in diameter, apparently frog's eggs. (v) An Amani snake held a caterpillar.

Parasites. Rarely infected. Nematodes (*Kalicephalus* sp. *and Ophidascaris* sp.) were found in only one Amani female.

Enemies. Thelotornis kirtlandii was seen to eat a *N. olivaceus* which was sharing the same cage; many others disappeared. The junior author has previously drawn attention to the frequency with which the tails are missing in this species. No fewer than twenty-nine out of the present series of sixty-eight are in this condition. In one case he was responsible, for having picked up a Dar es Salaam snake from beside an irrigation ditch, he was holding it by the tail, preparatory to dropping it into a bag, when the snake wriggled very violently so that it broke away, leaving the tail in his grasp. As Grayia is another genus where the caudal appendage is frequently short, it seems probable that waterside species are more subject to attack by herons and waders than other snakes and frequently escape by active wriggling. In many localities they doubtless suffer from the bites of turtles and fishes.

Habitat. Under bark or logs at the edge of the forest, not a forest species; under flat stones or rubbish in the native plantations. After heavy rain these snakes were sometimes found on the paths. They haunt the banks of streams and irrigation ditches and the edges of swamps.

Boaedon lineatus Duméril et Bibron

Boaedon lineatum Duméril et Bibron, 1854, 'Erpét. Gén.,' **7**, p. 363.

1 (M. C. Z. 23161) Bagilo, Uluguru Mtns., 29. ix. 26.
3 (M. C. Z. 23162–4) Nyange, Uluguru Mtns., 11. x. 26.
17 (M. C. Z. 23165–81) Amani, Usambara Mtns., xi–xii. 26.

Variation. Mid-body scale-rows 25–29. Ventrals 190–220. Anals single. Subcaudals 48–67. The series is almost equally divided as to sex and it is to be

observed that the sexes may be invariably distinguished by the ventral and subcaudal scale counts which, in the present series, are:

	Males	Females
Ventrals	190–201	209–220
Subcaudals	60–67	48–59

Labials 8, in one specimen 9, on one side of the head only; 3rd, 4th and 5th, or 4th and 5th, or 4th, 5th and 6th, labials enter the eye. In No. 23166 a small scale, almost like a third postocular, is wedged in between the 5th and 6th upper labials. Praeoculars very variable — 1 or 2; in specimen No. 23170 they are in contact with the frontal.

Measurements. Largest male 668 (533 + 135) mm., and female 915 (805 + 110) mm. Both from Amani.

Breeding. Adult female from Nyange held 16 eggs measuring 33 × 18 mm. on 11. x. 26. Another from Amani held 7 eggs measuring 35 × 16 mm. on 29. xi. 26.

Diet. A small (298 mm.) Bagilo snake was much distended with a mouse (*Leggada bella*). Small House Snakes certainly seem to live well, for no fewer than seven of ten young ones brought in at Nyange were gorged. A rat (*Rattus rattus alexandrinus*) was recovered from the stomach of an Amani House Snake.

Defence. When pressed, the cloacal glands of a small snake discharged a minute jet of clear but strong-smelling fluid.

Parasites. Tapeworms (*Ophiotaenia* sp.) and roundworms were taken from one Nyange female. Nematodes (*Kalicephalus* sp.) in several others as well as an Amani snake. A great many larval mites under the caudal scales of a Nyange individual.

[Lycophidion abyssinicum Boulenger]

Lycophidium abyssinicum Boulenger, 1893, Cat. Sn. Brit. Mus., **1**, p. 342 ('243'), Pl. XXII, f. 1.

The snake captured between Kilimanjaro and Taita and referred to this species by Mocquard (see Angel, 1925, Reptiles et Batraciens, in 'Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale [1911–1912],' p. 32) cannot now be located in the Paris Museum. The identification must remain extremely doubtful, as *L. abyssinicum* has never been recorded so far south before.

Lycophidion meleagris Boulenger

Lycophidium meleagris Boulenger, 1893, Cat. Sn. Brit. Mus., **1**, p. 337, Pl. XXI, f. 2.

1 (M. C. Z. 23182) Bagilo, Uluguru Mtns., 20. ix. 26.
1 (M. C. Z. 23183) Vituri, Uluguru Mtns., 9. x. 26.
4 (M. C. Z. 23184–7) Amani, Usambara Mtns., xi–xii. 26.
1 (M. C. Z. 23188) Bumbuli, Usambara Mtns., 16. xii. 26.

Variation. All have the normal 15 scale-rows at mid-body. The ventrals range from 147 to 164; subcaudals 22–34, thus increasing the known range for both ventrals and subcaudals. Taken by sexes the subcaudals in females are 22–32, in males 30–34. The series is too short to draw definite conclusions. The only points of difference, other than scale-counts, between this species and *L. capense*, as given in the Catalogue of Snakes, are that, in *L. meleagris*, the

a. Diameter of eye equals its distance from mouth, while in *capense* it is greater.
b. Rostral nearly twice as broad, as against twice as broad in *capense*.
c. Praefrontals a little broader than long, as against as long as broad or a little longer in *capense*.
d. Frontal as long as broad in both species, but in *capense* it is also sometimes a little longer.

Characters 'b,' 'c,' 'd' break down in the series before us. Further reference to these relationships will be found under *capense*.

Coloration. The tongue is white, tipped with grey.

Measurements. The largest male (Vituri) measures 353 (308 + 45) mm., largest female (Bagilo) 340 (310 + 30) mm. Smallest specimen, a female taken at Bumbuli 16. xii. 26, measures 217 (195 + 22) mm.

Breeding. Ova only slightly developed in one female from Amani, 19. xi. 26.

Diet. A Bagilo snake, being tremendously distended, was found on examination to have swallowed a skink (*Siaphos kilimensis*); in an Amani specimen there was a snake's tail.

Lycophidion capense (Smith)

Lycodon capensis Smith, 1831, S. Afr. Quart. Jour. (1), No. 5, p. 18.

1 (M. C. Z. 23189) Bagilo, Uluguru Mtns., 4. x. 26.
5 (M. C. Z. 23190–4) Nyange, Uluguru Mtns., 2–11. x. 26.
1 (M. C. Z. 23195) Vituri, Uluguru Mtns., 27. x. 26.
4 (M. C. Z. 23196–9) Amani, Usambara Mtns., 29. xi–30. xii. 26.
1 (M. C. Z. 23200) Bumbuli, Usambara Mtns., 16. xii. 26.

Variation. All have the normal 17 scale-rows at mid-body. Ventrals range from 195 to 215; subcaudals from 40 to 57, thus increasing the range for both ventrals and subcaudals — indeed, in both ventrals and subcaudals the numbers are consistently high. Taken by sexes the subcaudals in females range from 40 to 47, in males 52–57. Compare these with those in the Catalogue of Snakes based on South African, Angola, and Congo specimens which give subcaudals for females as 30–39, for males 34–45, which makes it impossible to determine sex on this basis if the range for the species over its whole area of distribution be taken into account, though it is probably good for any one locality.

The series agrees essentially with the characteristics of the species except that two big specimens are in accord with *L. meleagris* in the diameter of the eye, which only equals its distance from the mouth. In one of these from Amani, the horizontal diameter is much shorter than the vertical diameter. The character of eye-diameter in relation to distance from the mouth appears to be a good one except for very old snakes. The safest way, however, to distinguish between these two closely related species is by the scale-counts, viz.:

L. meleagris. Scale-rows 15, Ventrals 147–165, Subcaudals 22–34.
L. capense. Scale-rows 17, Ventrals 163–219, Subcaudals 24–57.

It seems very strange that they should occur together in four out of the five localities, but 15 scale-rows is certainly associated in these mountains with a lower number of ventrals 147–164, while conversely 17 scale-rows goes with a higher number, 195–215. One needs a large series of *Lycophidion* from the type locality of *jacksoni* to throw more light on the relationships of the three species.

Coloration. A Bagilo snake, taken on the site of my camp after I left, is uniformly jet-black.

Measurements. The largest male (Amani) measures 480 (400 + 80) mm., and the largest female (Amani) 623 (550 + 73) mm. The smallest (Vituri) snake, taken on 27. x. 26., measures 196 (170 + 26) mm.

Breeding. A Nyange female held 8 eggs measuring 20 × 8 mm. on 2. x. 26. A Bagilo snake, 7 eggs only 10 mm. long on 4. x. 26. An Amani reptile, 7 eggs measuring 17 × 9 mm. on 29. xi. 26.

Diet. At Nyange two snakes were taken with skinks (*Mabuya striata*) in their stomachs. At Amani, one with a *Mabuya comorensis*.

Mehelya capensis (Smith)

Heterolepis capensis Smith, 1849, 'Illus. Zoöl. S. Afr.,' **3**, Pl. LV.

2 (M. C. Z. 23201–2) Amani, Usambara Mtns., xi–xii. 26.
1 (M. C. Z. 23204) Misalae, Usambara Mtns., 7. xii. 26.

Variation. Internasals nearer seven-eighths than two-thirds the length of the praefrontals. In No. 23202 the frontal is as broad as long. In No. 23201 the frontal is shorter than its distance from the rostral. Nos. 23202 and 23204 are normal in having 1 prae- and 2 postoculars but No. 23201 has 2 prae- and 1 postocular. Through the courtesy of the Custodian of the Amani Institute I was enabled to examine the three local specimens in that collection, all of which agreed in having only 1 postocular, a condition, I believe, that has never been reported in any South African examples of this snake. The scale variation of

these six snakes is as follows. Scales on neck 21–22. Scales at mid-body 15. Ventrals 219–224. Anal single. Caudals 50–56. Upper labials 7, 3rd and 4th entering eye. Lower labials 7 or 8. Praeoculars 1 or 2. Postoculars 1 or 2.

Coloration. Tongue pink. The vertebral line and ventrals are *not* yellow except in snakes about to slough; in a freshly sloughed specimen they are pure china-white.

Measurements. Largest male (Misalae) 1250 (1073 + 177) mm., and the largest female (Amani) 1119 (1070 + 149) mm.

Breeding. The latter held six eggs (23203) just ready for laying; they measured 42 × 30 mm. The snake was found by my wife in loose soil and vegetable débris at the base of a large tree in an open pasture, 19. xi. 26. Its old yellowish skin was in process of being shed and the creature was very docile, making no attempt to bite. An old egg-shell was found among the débris.

Temperament. The docile nature of this species was further exemplified by the male which I caught at 11 P.M. on the Misalae path while we were on the march in drizzling rain. It offered no resistance to capture and though frequently handled the following day never once attempted to bite.

Chlorophis neglectus (Peters)

Philothamnus neglectus Peters, 1866, Monatsber. Akad. Berlin, p. 890.

1 (M. C. Z. 23205) Bagilo, Uluguru Mtns., 19. ix. 26.
8 (M. C. Z. 23206–13) Nyange, Uluguru Mtns., 1–9, x. 26.
6 (M. C. Z. 23214–9) Vituri, Uluguru Mtns., 9–29. x. 26.
1 (M. C. Z. 23224) Dar es Salaam, Uluguru Mtns., 6. xi. 26.
2 (M. C. Z. 23220–1) Amani, Usambara Mtns., 29. xi. 26.
2 (M. C. Z. 23222–3) Bumbuli, Usambara Mtns., 14. xii. 26.
10 (M. C. Z. 23224–33) Mlalo nr. Hohenfriedeberg, xii. 26.

Also taken at Phillipshof but not preserved.

Ngole in Kikami, but the name is also applied to *Dispholidus typus* and probably *Philothamnus semivariegatus* as well.

Variation. Mid-body scale-rows 15. Ventrals 141–164. Subcaudals 81–119. No fewer than twenty-five of these thirty snakes have the normal 8 labials, fourth and fifth entering the eye; two have fourth and fifth on one side of the head, and fifth and sixth on the other where there are 9 labials; one had 9 labials, fifth and sixth entering eye on both sides of head; yet another, which has the normal number of 8 labials on both sides, has the fourth, fifth and sixth labials entering the eye on one side only. No. 23224 has a small supernumerary scale wedged between the labials on the left side of the head.

What is stated below as regards determination of sex in *C. macrops* by means of scale-counts applies equally to the present species.

Coloration. While this snake is almost invariably uniformly green, at Nyange a number were brought in on which there was a series of paired black spots on the nape; in many these had coalesced. A female at Vituri was marked in the same way.

Measurements. Largest specimen, probably a female, from Mlalo measures 896 (612 + 284) mm. No young examples were preserved.

Habitat. Taken on bushes, one from Dar es Salaam on the thatch of a watcher's hut in the rice swamps.

Breeding. A Nyange female held six eggs measuring 20 × 7 mm. on 1. x. 26; a Vituri snake three eggs measuring 34 × 10 mm.

Diet. A Bagilo snake was captured on the edge of the rain-forest with an *Arthroleptis stenodactylus* in its mouth. A Vituri snake had also swallowed one of these frogs. A Nyange snake had a frog, a Buprestid beetle and a grasshopper's leg in its stomach. The frog was too digested to be definitely determined but was apparently an *Arthroleptis*. It is reasonable to suppose that the insects were liberated from the frog's stomach. In captivity at Dar es Salaam, three or four of these snakes died after making heavy meals on *Rana mascareniensis*, the prey being nearly digested away. One was seen to capture and swallow a gecko (*Lygodactylus p. picturatus*).

Enemies. At least one green snake was eaten by a *Thelotornis kirtlandii* which was sharing the same cage.

Parasites. At Bagilo some cysts (*Acanthocephala* immature) were found encysted on the outer wall of the intestinal tract, also a mature ♀ *Acanthocephala*. At Nyange several snakes affected with subdermal parasites of the same species were brought in and died within a few days; no nematodes were located in their alimentary canals. At Vituri other freshly captured snakes were suffering from these encysted worms.

Chlorophis macrops (Boulenger)

Oligolepis macrops Boulenger, 1896, Cat. Sn. Brit. Mus. **3**, p. 644.

22 (M. C. Z. 23236–57) Amani, Usambara Mtns., xi–xii. 26.
Nyoka ya mani in Kisumbara.

Variation. This species was based on a single young snake from the Usambara Mtns., and was made the type of the genus *Oligolepis* by Boulenger. It was transferred to *Chlorophis* by Sternfeld after the examination of a dozen

snakes from the region. The species is valid, though it was based on an aberrant individual. The present series are topotypes.

Undoubtedly its most important character is the 13 mid-body scale-rows; all other members of the genus have 15. Twenty-one snakes in the present series have 13, while one male (23236) has only 11; this same reptile is also unique in possessing an undivided anal shield. It is to be noted that Sternfeld had also a single specimen with a similar anal. Ventrals range from 136 to 169 (type had 148). Subcaudals range from 82 to 122 (type had 75). In the type there are 9 upper labials, fifth and sixth entering the eye; this is the case in only two of the present series, while four more have this condition on one side of the head with the more normal 8 labials, fourth and fifth entering the eye, on the other side of the head; no fewer than sixteen snakes have 8 labials, fourth and fifth entering the eye, which must therefore be regarded as the normal state. It is interesting to note that where 9 labials are present it is almost invariably due to the division of the third labial so that it automatically results in the fifth and sixth entering the eye.

Sternfeld has already reported some of these variations, including cases where the fourth, fifth and sixth labials entered the eye. He has also drawn attention to the moderate keeling of the ventrals, all of which points Boulenger seems to have ignored when compiling his key to the Snakes of East Africa (Proc. Zoöl. Soc. Lond., 1915, p. 622).

Sex cannot be definitely told by counting subcaudal scale-rows as they overlap. In males 85–122 (average 96), females 82–87 (average 85). The sexes in the above series are equally divided and it would appear that all snakes with more than 90 subcaudals are males.

Relationship. The amendments to the original description as enumerated above cause this snake to fall into the *neglectus* section of the key, and indeed *macrops* is so nearly related to that species that it can be separated only on the basis of its 20 maxillary teeth (20–27 in *neglectus*) and number of scale-rows at mid-body. Were it not that two specimens of *neglectus* were also brought in at Amani one would be tempted to consider *macrops* as a subspecies of *neglectus*, being in the same relation to it as is *Typhlops gierrai* to *T. punctatus* and *Crotaphopeltis tornieri* to *C. hotamboeia*, i.e., a mountain form with reduced scale-rows. It is still possible that the *neglectus* referred to may have been caught lower down the mountain, for in an hour one can readily ascend a thousand feet.

Coloration in life. Female (No. 23238). Above, head green, body and tail olive, thirty-two transverse bands of varying distinctness on the body; these are

formed by light-yellow spots on scales bounded by black spots. Below, chin and throat white, rest of under surface yellowish, each ventral scale edged with black laterally, their free edges tinged with bluish-grey.

A young female (No. 23241). Above, head olive, body and tail brown, forty-two transverse bands of varying distinctness on the body; these consist of pale-green bands, turning to Cambridge blue on the flanks, bounded by black lines. Below, chin and throat white, rest of lower surface light green.

A very old female (No. 23239). Above, uniformly brown or olive-brown. Below bluish-white. Of yet others I have noted a female bright green. A juvenile male, very young, yet dark olive colour. Two males, taken the same day, differed in the colour of their labials, one being bright green and the other olive-coloured. Several of the smaller snakes were indistinguishable in colouring from *C. neglectus*.

Measurements. Largest male 810 (560 + 250) mm.; largest female 915 (655 + 260) mm. Smallest specimen, a male taken 25. xi. 26, measures 200 (130 + 70) mm.

Habitat. In bushes on the outskirts of the forest, especially those bordering streams.

Breeding. Five eggs measuring 29 × 11 mm. on 19. xi. 26. Six eggs measuring 36 × 15 mm. on 20. xi. 26. Fourteen eggs (9 on one side, 5 on the other) measuring 30 × 12 mm. on 22. xi. 26. Three eggs measuring 34 × 10 mm. on 24. xi. 26. Most of the other females held eggs less developed.

Diet. Stomachs of all fifteen snakes taken in November were empty.

Philothamnus semivariegatus (Smith)

Dendrophis (*Philothamnus*) *semivariegata* Smith, 1840, 'Illus. Zoöl. S. Afr.,' **3**, Pls. lix, lx, and lxiv, fig. 1.

1 (M. C. Z. 23259) Vituri, Uluguru Mtns., 28. x. 26.
1 (M. C. Z. 23260) Zigi, Foot of Usambara Mtns., 29. xi. 26.
8 (M. C. Z. 23261–8) Amani, Usambara Mtns., xi–xii. 26.

Variation. Mid-body scale-rows 15. Ventrals 164–172. Subcaudals 125–153. Nine upper labials, fifth and sixth entering the eye except in No. 23263 where it is the fourth, fifth and sixth that enter. The temporals are almost too variable to describe; five specimens have the normal 2 + 2; in four others either the upper or lower of the first pair is divided.

The number of times the tail is contained in the body length is 1.74 to 1.79 in males, 1.75 to 2.29 in females. Ventral and subcaudal scale-counts are equally useless as an aid to distinguishing the sex.

Relationship. We imagine that the reasons Boulenger (1919, Rev. Zoöl. Africaine, vii, p. 23) referred Cameroon snakes to *semivariegatus* instead of to *nitidus* was because he considered that the characters on which these snakes were held to be distinct were not specific.

Schmidt (1923, Bull. Am. Mus. Nat. Hist., 49, p. 78) reports on a series of fifteen *nitidus* from the Congo, which adds considerably to our knowledge of the scale ranges in that species. Without consulting *all* the extensive literature it may be said that *P. nitidus* has 163–175 ventrals, 125–153 subcaudals, 1 + 2 (rarely 1 + 1) temporals; *P. semivariegatus*, 149–207 ventrals, 112–159 subcaudals, 2 + 2 (rarely 1 + 1, 1 + 2, or 2 + 1) temporals.

The greater scale range of *semivariegatus* is quite probably due to the fact that much larger series of this more widely distributed snake have been examined. The temporals seem to be the only character which distinguishes the two species and we consider it probable that *nitidus* is entitled to rank only as a subspecies of *semivariegatus*.

Measurements. Largest male measures 1125 (717 + 408) mm.; largest female 1012 (705 + 307) mm. Both from Amani.

Correction. Through the courtesy of M. Angel the junior author was able to examine the snakes [1] from Kibwezi, Kenya Colony and Bura, Teita, K. C., identified by M. Mocquard as *Philothamnus nitidus* Gunther and *P. dorsalis* Bocage, and has no hesitation in referring them both to *P. semivariegatus*. The specimen referred to *dorsalis* has a piece of the anterior temporal split off so that it might be considered as 2 + 1 or 1 + 1 + 1; apart from this it differs from *dorsalis* only in that the frontal is shorter, not longer, than its distance from the end of the snout. Ventrals 190; caudals 136 — tip missing. The specimen referred to *nitidus* has the frontal equal to, not shorter than, the parietals. Ventrals 196; caudals 142 — tip missing; temporals 1 + 2. If M. Mocquard took the trouble to count the ventrals there seems no reason why he should have referred this snake to anything but *semivariegatus*.

[1] Angel, 1925, Reptiles et Batraciens, in 'Voyage de Ch. Alluaud et R. Jeannel en Afrique orientale (1911–1912),' pp. 32–33.

PROSYMNA ORNATISSIMA sp. n.

Plate **2**, fig. 2

3 (M. C. Z. 23269–71) Nyange, Uluguru Mtns., 4, 6, 7. x. 26.
1 (M. C. Z. 23272) Vituri, Uluguru Mtns., 9. x. 26.

Type. No. 23271. Museum of Comparative Zoölogy. Sex ♀. From Nyange, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 7th, 1926.

Paratypes. Nos. 23269, 23270, 23272.

Affinities. In a genus whose characters are so very variable it is little more than speculation to say that it seems nearest to *P. ambigua* Bocage. See discussion under that species.

Diagnosis. Its remarkable black and scarlet colouring distinguishes it from all other members of the genus. Its subcaudal range is higher than any other East African species.

Description. Rostral very large and broad, with sharp horizontal edge separated from the praefrontal; a single internasal and a single praefrontal; frontal large, more than half the width of the head, as long as the parietals; loreal wedge-shaped, longer than deep; 1 prae- and 1 or 2 postoculars (2 on the right side of head, 1 on left. In paratype 23269 there is no postocular on the left side as it has fused with the supraocular. In all the other paratypes there is 1 postocular); temporals 1 + 2 (in No. 23270 the anterior temporal enters the eye below the postocular on the right side of the head); six upper labials, third and fourth entering the eye; one pair of well-developed chin-shields followed by three more or less enlarged scales. Scales smooth, in 15 rows. Ventrals 150 (127–132 in ♂ paratypes); anal entire; subcaudals 27 (35–40 in ♂ paratypes).

Coloration in life. Above, black, head scarlet, except for an arrow-shaped extension of the black body-colouring which reaches to the frontal, and a vertical black streak from the supralabials to the eye (in No. 23270 these streaks are united by a black band which crosses the praefrontal and the anterior edge of the frontal); thirteen transverse, more or less complete, scarlet bands on the body, four alternating latero-dorsal blotches on tail (in the paratypes fourteen on body and four on tail); these scarlet bands are very irregular, often interrupted on the vertebral line or more or less broken and alternating. Below, throat pink, the rest of the undersurface black except where the lateral scarlet blotches impinge on the outer edges of the ventrals so as to tinge them with red.

Measurements of Type ♀		*Paratype* ♂ ♂ ♂	
Length of head and body	252 mm.	Length of head and body	117, 210, 242 mm.
Length of tail	34 "	Length of tail	26, 54, 55 "
Diameter of body	9 "	Diameter	5–8 "

Breeding. No. 23269 is very young, the ventral scutes in the umbilical region being still unhealed when it was caught on 4. x. 26.

Habitat. I was climbing up the lower slopes of Mt. Tongoni when my gun bearer, who was preceding me, called out that a snake was wriggling into the undergrowth on the edge of the cultivated plot at a spot where it was only thirty yards from many acres of rain-forest. A woman who was hoeing weeds in the plot remarked that she had just hoed up and killed this snake; presumably the first part of her story was more accurate than the second! The other three examples were found under piles of weeds in similar native clearings near the rain-forest.

[Prosymna ambigua Bocage]

Prosymna ambiguus Bocage, 1873, Jour. Sc. Lisb., **4**, p. 218. (Duque de Braganca, Angola.)
Prosymna bocagii Boulenger, 1897, Ann. Mag. N. H. (6) **19**, p. 278, fig. (Zongo, Ubongi Rapids, Congo.)
Prosymna vassei Mocquard, 1906, Bull. Mus. Paris, p. 250. (near Mozambique.)
?*Prosymna transvaalensis* Hewitt, 1910, Ann. Trans. Mus. **2**, p. 73. (Tzaneen, Zoutpansberg District, Transvaal.)

In critically examining the status of the species of Prosymna before describing *P. ornatissima*, a re-examination was made of the Lumbo example of *P. ambigua* recorded, together with two found bottled at Morogoro, by the junior author in 1923.[1] The results of this investigation as set forth below force us to the conclusion that both *P. bocagii* Blgr. and possibly *P. transvaalensis* Hew. must be added to the synonymy of *P. ambigua*. Alternately it may be found that true Angolan *ambigua* have 17 scale-rows only, while South and East African agree with the Congo *bocagii* in having 15; in this event *P. bocagii* will stand.

Lumbo is on the seashore about three miles from Mozambique, so that the Lumbo snake is almost topotypic with Mocquard's *P. vassei* which Boulenger has already placed in the synonymy of his *P. bocagii*. In our opinion the specimen before us bridges over the differences between *P. bocagii* and *P. ambigua* and a careful perusal of Hewitt's remarks, one paragraph of which we quote below, only confirms us in the view that we are here dealing with a very variable and wide-ranging species. For convenience of comparison we tabulate the scale formulae as follows:

[1] Loveridge, 1923, Proc. Zoöl. Soc. Lond., p. 880.

SCALE FORMULAE OF PROSYMNA TYPES

	P. ambigua of Blgr. Cat. Su. II. 248	*P. ambigua* Bocage's Type	*P. bocagii* Boulenger's Type	*P. vassei* Mocquard's Type	Specimen from Lumbo Mozambique M. C. Z. 18,203	*P. transvaalensis* Hewitt's Type
Scale-rows	15–17	17	15	15	15	15
Ventrals	135–152	149	167	151	148	156
Subcaudals	19–34	19	19	17	20	22 (26)
Supralabials	6–7	6	6	6	6	6
Labials entering eye	3rd and 4th	3rd and 4th	3rd and 4th	2nd, 3rd, 4th	3rd and 4th	3rd and 4th
Praefrontal	Not bordering eye	Not bordering eye	Bordering eye	Upper end of small praeocular in contact with praefrontal	Not bordering eye	Presumably not bordering eye
Frontal	?	?	Anterolateral angles reach eyes	Anterolateral angles reach eyes	Anterolateral angles not reaching eyes	Anterolateral angles not reaching eyes
Postoculars	2	2	1	?	2	1 On right side supra and postocular are fused
Pairs of chin-shields	1	1	1	1	1	2

Hewitt's *P. transvaalensis* may prove to be a good race based on the two pairs of chin-shields and coloration, the latter approximating to the condition met with in *P. melcagris* of West Africa. Besides his type from Tzaneen, he had 'also three specimens from Medingen, Klein Letaba (Rev. W. Krause). The largest of these agrees with the type, excepting in that the supraocular is not fused with the postocular on either side. The two other specimens, both juvenile, are aberrant, in that one of them has two postoculars and two suboculars, which latter separate the eye from the upper labials, while in the other specimen labials two and three on the right side, and two, three and four on the left side enter the eye. Moreover in these young specimens, the rostral is not so angular as in the adults.'

The last point is interesting in view of Boulenger stating that his *P. bocagii* differs from *P. ambigua* 'in the more prominent, slightly turned up snout.' His *P. bocagii* had a total length of 340 mm., while the biggest specimen of *P. ambigua* mentioned in the Catalogue of Snakes was only 225 mm.

DASYPELTIDAE

Dasypeltis scaber (Linnaeus)

Coluber scaber Linnaeus, 1766, 'Syst. Nat.' **1**, p. 384.

1 (M. C. Z. 23273) Nyange, Uluguru Mtns., 7. x. 26.
1 (M. C. Z. 23274) Amani, Usambara Mtns., 30. xi. 26.

Variation. Mid-body scale-rows 25. Ventrals 241–244. Subcaudals 82–87.

Coloration. Both are of the pinkish-brown type with vertical lateral stripes; in the larger snake these are almost united on the dorsal line by three minute cream spots between each pair of stripes; this snake has also a brownish dorsal band along the whole length of its body and tail.

Measurements. The larger (Amani) of the two females measures 785 (640 + 145) mm.

Breeding. Three eggs measuring 25 × 10 mm. were found in the Amani snake on 30. xi. 26.

Diet. Fragments of egg-shell, apparently of a weaver bird's egg, having red spots on a white ground, were recovered from the stomach of the Nyange reptile; its stomach also contained a stiff mass of yolk.

Enemies? A second egg-eater was taken at Nyange in a grass hut. It was temporarily placed in a vivarium where it was apparently eaten by a Bird snake (*Thelotornis kirtlandii*).

BOIGIDAE

Geodipsas vauerocegae Tornier

Geodipsas vauerocegae Tornier, 1902, Zoöl. Anz. **25**, p. 703.

1 (M. C. Z. 23278) Bagilo, Uluguru Mtns., 28. ix. 26.
2 (M. C. Z. 23279) Nyange, Uluguru Mtns., 4 and 9. x. 26.
4 (M. C. Z. 23280–3) Vituri, Uluguru Mtns., 28. x. 26.
11 (M. C. Z. 23284–94) Amani, Usambara Mtns., xi–xii. 26.

Distribution. This species is here recorded for the first time as occurring in the Uluguru Mtns., being until now known only from its type locality 'Usambara.'

Variation. Mid-body scale-rows 17. Ventrals 124–133. Anal single. Subcaudals 36–48. Praeoculars 2. Temporals 1 + 2 (except No. 23290 where there are 2 + 2). Supralabials 7, third and fourth entering the eye. It will be seen that the range of variation in this species is extremely small but it should be noted that the frontal is often *considerably* longer than its distance from the end of the snout; the nasal is frequently *not* in contact with the second labial; three

or *four* lower labials are in contact with the anterior chin-shields, which are *longer* or *shorter* than the posterior in many specimens (in the type they were 'as long as the posterior').

In those specimens that were carefully sexed in the field, the ventral range in males is 124–128, in females 131–133; subcaudal scale-counts of the two sexes overlap entirely. The length of the tail is contained in the body length 4.26 to 5.1 times in males, 4.99 to 5.69 times in females.

Coloration in life. Nyange ♀ (No. 23279). Above, brown; each scale edged with darker; supralabials yellow, their upper portion dusky; a broad black band on the nape touches the parietals and is followed by eight pairs of very indistinct black spots. Below, uniformly yellow except for dusky specklings on all the outer edges of the ventrals except the free edge.

Young Bagilo ♀ (No. 23278). Above and below, uniformly black except the head scales anterior to the eyes, the labials and the gular scales, all of which are black with a white centre. In the Amani series some snakes are uniformly black beneath, others pure white with brown specklings.

Measurements. Largest (Amani) male measures 332 (275 + 57) mm.; largest (Nyange) female 370 (313 + 57) mm.; the smallest snake, a female taken at Amani on 25. xi. 26, measures 168 (135 + 33) mm.

Breeding. In the Nyange female were 8 eggs measuring 6 mm. long on 4. x. 26. Undeveloped eggs in an Amani snake collected 25. xi. 26.

Diet. An undeterminable frog was in one of the Amani snakes.

Parasites. Large numbers of mites were found under the ventral scutes of a Vituri snake (No. 23280).

Habitat. The Bagilo snake was taken under a branch in a clearing in the rain-forest; the Nyange snakes, under logs in a clearing occasioned by the fall of a huge tree.

Geodipsas procterae Loveridge

Geodipsas procterae Loveridge, 1922, Proc. Zoöl. Soc. London, p. 313.

1 (M. C. Z. 23275) Bagilo, Uluguru Mtns., 28. ix. 26.
1 (M. C. Z. 23277) Nyange, Uluguru Mtns., 6. x. 26.

Distribution. Hitherto only known from two males taken at Bagilo in 1921 and 1922; both the present snakes are females.

Variation. Mid-body scale-rows 17. Ventrals 147. Subcaudals 34. Like the second male taken, these females differ from the type in having the third, fourth and fifth labials entering the eye; the anterior chin-shields are a little *longer* than the posterior; both agree in having 2 prae- and 2 postoculars.

Diagnosis. This species is still readily distinguished from *G. vauerocegae* by its single subcaudals, more numerous ventrals, labials and praeoculars, viz.:

G. procterae. Ventrals 147–153. Subcaudals 34–49. Labials 8, 3rd, 4th, and 5th entering eye (rarely only 4th and 5th). Praeoculars 2.

G. vauerocegae. Ventrals 124–133. Subcaudals 34–48. Labials 7, 3rd and 4th entering eye. Praeocular 1 (rarely 2).

Measurements. The largest (Bagilo) female measures 505 (450 + 55) mm. The tip of the tail is wanting.

Coloration in life. In these females there is no trace of the dorsal stripe of the type. The Bagilo adult is uniformly purplish iridescent black above; below, bluish-white with the exception of the chin and throat, which are pure white. It differs from both the males in the colouring of the ventral surface.

Breeding. The oviducts of the Bagilo snake contained 13 eggs measuring 18 × 10 mm. on 28. ix. 26.

Diet. In the stomach of the Nyange snake was one of the frogs (*Hoplophryne uluguruensis* sp. n.) of which several were taken in the banana plants against whose base the snake was coiled.

Habitat. The Nyange snake, which I personally caught, was found among vegetable débris at the base of a wild banana (*Musa uluguruensis* Warb. or *ensete* Gmel.) growing in a ravine near the summit of Mt. Tongoni.

Crotaphopeltis hotamboeia hotamboeia (Laurenti)

Coronella hotamboeia Laurenti, 1768, 'Syn. Rept.,' p. 85.

1 (M. C. Z. 23295) Nyange, Uluguru Mtns., 7. x. 26.
1 (M. C. Z. 23296) Dar es Salaam, 4. xi. 26.
1 (M. C. Z. 23297) Mombo at foot of Usambara Range, 31. xii. 26.

Variation. These specimens are all normal; that is to say, they agree in having a single praeocular in contact with the frontal. Scale-rows 19. Ventrals 155–168. Caudals 40. The Mombo snake has temporals 1 + 1 and only the 4th and 5th labials entering the eye in lieu of the 3rd, 4th, and 5th.

Coloration. The Mombo snake is strikingly different from any other example of the species which I have seen. The whole of the upper head, including upper lip, black. Symphisial and first three lower labials on one side, first four on left side, dusky, rest of the lower labials and throat pure white; the black of the upper surface encroaches on the ventrals to the same extent that the dorsal colouring does in *Natrix olivaceus*, more so in certain areas where it almost excludes the white.

Diet. Stomach of the Dar es Salaam snake revealed the feet of a frog with large disks; his intestines were full of ant remains which may reasonably be supposed to have been liberated from the frog's stomach.

Parasites. The Nyange female had a cyst upon its liver; the Dar es Salaam snake's stomach held a single nematode.

Enemies. One sunny morning, while walking along the path from Dar es Salaam to Mogogoni, my attention was drawn to a Sharp-snouted Snake (*Rhamphiophis oxyrhynchus*) engaged in trying to swallow a White-lipped Snake whose head and neck were already in its mouth. The White-lipped Snake had, however, inserted its tail into the entrance hole of an ant's nest which was situated at the base of a bush. With the leverage thus obtained it steadily drew itself down the hole until but three inches of its neck remained visible. To reach the combatants I had to crawl in under the bush on hands and knees, after which I squatted above them in my cramped quarters, planning how to seize the Sharp-snouted Snake, which was well protected by thorny sprays. Though my deliberation was only a matter of seconds, the snake disgorged its prey and darted away like lightning. Simultaneously the White-lipped Snake withdrew its head into the hole. We hunted for the Sharp-snouted Snake but failed to secure it amidst the tangle of brambles and rank grass. Returning to the ant-hole, I was not surprised to see the White-lipped Snake emerging literally covered with ants which were biting him unmercifully.

Crotaphopeltis hotamboeia tornieri (Werner)

Leptodira tornieri Werner, 1876, Sitzber. Akad. Wien, **116**, p. 1875.

7 (M. C. Z. 23298–23304) Bagilo, Uluguru Mtns., 23–29. ix. 26.
13 (M. C. Z. 23305–17) Nyange, Uluguru Mtns., 1–9. x. 26.
5 (M. C. Z. 23318–22) Vituri, Uluguru Mtns., 8–28. x. 26.
19 (M. C. Z. 23323–34) Amani, Usambara Mtns., xi–xii. 26.
1 (M. C. Z. 23135) Mt. Lutindi, Usambara Mtns., 10. xii. 26.

Variation. Mid-body scale-rows 17–19. Thirty-seven of the forty-six snakes have 17 scale-rows, one has 18, seven have 19. Ventrals range from 145 to 172; the average in Uluguru snakes is considerably higher than in those from the Usambara, viz. 163 and 152; nor is this a question of sex, for the average by sex in the Uluguru is 165 for males, 162 for females; in the Usambara 151 for males, 153 for females. Subcaudals range from 35 to 56, the average in males being 48 and in females 45 (Uluguru males 50, females 48; Usambara males 46, females 42). It may be definitely assumed that in this species neither the ventral nor subcaudal scale-counts are any guide to sex. Chin-shields range from 3 to 6, with an average

of 3 (nearly 4 in Uluguru). Thirty-three of the forty-five snakes have 3 praeoculars; six have 2 praeoculars on one side and 1 on the other; six have 1 praeocular on both sides of the head, but in one specimen these are semidivided. Seventeen snakes agree with the type in having the praeocular in contact with the frontal; four are in contact on one side only; twenty-three agree with *hotamboeia* in not having them in contact. Thirty-three snakes have 1 + 2 temporals; six have 1 + 1; one has 1 + 3; the remaining five are irregular combinations with 1 + 2 on one side of the head and 1 + 1 or 1 + 3 on the other. Eight (very rarely 9) upper labials, ten lower labials; in twenty-six snakes the third, fourth and fifth labials enter the eye; in the remainder the fourth and fifth, or fourth, fifth and sixth, sometimes on one side only.

Relations. As *tornieri* intergrades with *hotamboeia* in so many respects, it appears to us desirable to emphasize this relationship by making it a subspecies of the older name, of which it forms a good mountain race characterized by 17 (rarely 18 or 19) scale-rows; usually, but by no means always, 3 praeoculars of which the uppermost may, or may not, be in contact with the frontal.

Coloration in life. Males (Bagilo). Above, uniformly plumbeous with iridescent sheen; in one specimen the head is noticeably olive. Below, mental and a pair of lower labials on either side of it, dusky brown; rest of chin, throat and anterior ventrals, whitish; in one individual the white persists along the centre of the ventrals almost to the anus, the borders of the ventrals being dusky; in the other the dusky borders encroach upon the white so as to obliterate it about two inches behind the head, leaving the rest of the undersurface uniformly plumbeous, as are the undersides of the tails in both snakes. Eye reddish-brown with vertical black pupil.

Measurements. The largest male (Bagilo) measures 530 (445 + 85) mm.; the largest female (Vituri) 471 (437 + 34) mm.; the smallest snake, a male taken at Amani on 25. xi. 26., measures 203 (170 + 33) mm.

Breeding. Nine small eggs measuring 7 × 4 mm. in a 511 mm. female taken at Bagilo on 29. ix. 26. Three eggs measuring 26 × 7 mm. in a 390 mm. female at Nyange on 4. x. 26.; six eggs 16 × 8 mm. at same place on 8. x. 26. Four eggs 18 × 8 mm. in a female at Amani on 25. xi. 26.

Diet. A frog-eater. At Bagilo *Callulina kreffti, Breviceps rugosus* and a green grub were recovered from stomachs. At Nyange three *Arthroleptis stenodactylus* in one snake, *B. rugosus* in another. At Vituri *A. stenodactylus* and *Leptopelis uluguruensis* sp. n. At Amani *Arthroleptis xenodactylus* and *C. kreffti.* At Mt. Lutindi a *C. kreffti.*

Parasites. Nematodes (*Kalicephalus* sp. and immature Ascarids) are commonly found in the stomach of this species and were preserved from all localities. Cestodes (*Ophiotaenia crotaphopeltis* sp. n.) were associated with the former in a Nyange male.

Enemies. A Bird Snake (*Theoltornis kirtlandii*) was discovered with a large Tornier's Snake in its mouth. The Bird Snake held on doggedly, occasionally chewing with its poison fangs. The Tornier's Snake felt about with its tail for twigs and branches on which to gain a purchase. After eight minutes spent in this way the Bird Snake tried to swallow and was then observed to be in difficulties; the Tornier's Snake had hooked its teeth into the mucous membrane of the Bird Snake's mouth. I therefore separated them. The Tornier's Snake tried to make off but the Bird Snake, which had itself withdrawn, returned swiftly, and seizing its victim began to swallow it again. The Tornier's Snake being a large one, deglutition was unusually laboured. It took an hour, all but four minutes, from the time when I first noticed that this Bird Snake had seized one of its companions in the vivarium.

Habitat. The first specimens were found at Bagilo beneath a massive piece of tree-trunk, which was resting on a litter of twigs which raised it somewhat from the ground. It was the only dry piece of ground which I had seen during the day, for the whole rain-forest region was sodden after the heavy downpour of the previous day. The log was in a fairly recent clearing occasioned by the fall, and subsequent cutting up, of a giant tree. Six snakes were taken at the spot, which was typical of the situations in which the large Amani series were captured.

Temperament. When uncovered these snakes started to wriggle away and when gently seized made no attempt whatever to bite; this attitude was typical of the whole large series, which displayed a gentleness in sharp distinction to *L. h. hotamboeia*, which is notorious for its irascibility.

Thelotornis kirtlandii (Hallowell)

Leptophis kirtlandii Hallowell, 1844, Proc. Acad. Nat. Sci. Philad., p. 62.

1 (M. C. Z. 23336) Nyange, Uluguru Mtns., 4. x. 26.
1 (M. C. Z. 23337) Vituri, Uluguru Mtns., 27. x. 26.
11 (M. C. Z. 23338–23348) Amani, Usambara Mtns., xi–xii. 26.
2 (M. C. Z. 23349–23350) Mlalo nr. Ambangula, Usambara Mtns., xii. 26.

Lukukuru (Kikami); *sungahuni* (Kisumbara).

Variation. Ventrals 154–170. Subcaudals 113–169. In males the ventral count averages slightly lower than in females and the subcaudals slightly higher, but much overlapping occurs. There is also overlapping in the relation of tail

length to body length according to sexes. In addition to the variations recorded in the Catalogue of Snakes, iii, p. 185, only eight specimens have the normal fourth and fifth labials entering the eye; five have the third, fourth and fifth; while two combine these conditions on the two sides of their heads. In one snake with nine labials on the left side of its head, the seventh labial is divided into three scales thus: $\frac{1}{1} + 1$. A single snake has 2 praeoculars. All but two have normal temporals, viz., 1 + 2; the others have 1 + 3 and 2 + 2.

Measurements. The largest male measures 1215 (765 + 450) mm., yet has the tip of its tail missing; the largest female 1212 (740 + 472) mm. Both from Mlalo. An Amani female whose tail has been chopped off measures 50 mm. longer in the body than even the fine Mlalo reptile.

Breeding. A Nyange female held five eggs measuring 15 × 5 mm. on 4. x. 26.

Diet. As already related the Bird Snake will eat other snakes when in captivity. The Nyange female, being temporarily placed in a vivarium containing other snakes, was observed to be swallowing a *Natrix olivaceous* about 10 A.M. the following day. On chloroforming the Bird Snake the same evening, I found the head already digested from the body of the Natrix and also that a *Chlorophis neglectus* had been taken a day or two before. *Crotaphopeltis hotamboeia tornieri* was also eaten by this species.

Parasites. A fragment of a cestode (*Ophiotaenia* sp) was found in a Nyange snake.

Dispholidus typus (Smith)

Bucephalus typus Smith, 1829, Zoöl. Jour., 4, p. 441.

1 (M. C. Z. 23351) Bulwa, Usambara Mtns., 23. xi. 26.
1 (M. C. Z. 23352) Amani, Usambara Mtns., xii. 26.
1 (M. C. Z. 23353) Kizara, Usambara Mtns., 9. xii. 26.
1 (M. C. Z. 23354) Bumbuli, Usambara Mtns., 16. xii. 26.
1 (M. C. Z. 23355) Sakkarani, Usambara Mtns., 18. xii. 26.
1 (M. C. Z. 23356) Lushoto, Usambara Mtns., 19. xii. 26.
1 (M. C. Z. 23357) Mlalo near Ambangula, Usambara Mtns., xii. 26.

A half-grown specimen was also collected at Mlalo nr. Hohenfriedeberg and taken to London alive. All the above are adult.

Ngole in Kikami and Kisumbara; in Kikami, however, this name is also applied to *Chlorophis neglectus*.

Variation. Mid-body scale-rows 19–21, the latter on the Lushoto snake only. Ventrals 173–191. Subcaudals 114–130. Supralabials 7, third and fourth entering the eye. Temporals 1 + 2. Praeoculars 1 and postoculars 3, except in No. 23351 where on the right side they are 2 + 3, on the left 1 + 4, a most unusual variation.

By sexes, the ventrals in males 173–175, in females 183–191; subcaudals in males 124–130, in females 114–124, but three are omitted on account of the

tips of their tails being missing. Schmidt's Congo series (1923, Bull. Am. Mus. Nat. Hist., xlix, pp. 114–116) show that the lower number of ventrals in males is a guide to sex though they overlap in the region of 183–186; subcaudals are useless as a guide to sex.

Coloration. All are bright livid green or grey-green, except the Amani snake, which is reddish, and the wholly black Mlalo specimen.

Measurements. Largest male measures 1652 (1200 + 452) mm.; largest female 1775 (1320 + 455, tip of tail missing). Possibly both of these are records.

Breeding. Eggs measuring 43 × 17 mm. were found in the Mlalo snake obtained by my collector during the last few days of December.

Diet. The Bulwa snake had bird's eggs in its stomach; the Lushoto Boomslang had recently swallowed a Two-horned Chameleon (*Chamaeleo fischeri multituberculatus*).

Temperament. I was told that these snakes are very common in the gardens of Lushoto. My attention was drawn to one in a tall privet-like hedge surrounding the hotel. I gently took the reptile by the tail and so held it as it quietly strained to be free, until my wife fetched my snake stick. It made no attempt to bite when pulled out of the tree and pinned down.

Calamelaps unicolor (Reinhardt)

Calamaria unicolor Reinhardt, 1843, Danshe Vidensk. Salsk, Afh., **10**, p. 236, Pl. I, figs. 1–3
Calamelaps polylepis Bocage, 1873, Jorn. Sc. Lisb., **4**, p. 216.

1 (M. C. Z. 23358) Nyange, Uluguru Mtns., 11. x. 26.
3 (M. C. Z. 23359–62) Amani, Usambara Mtns., 22. xi–xii. 26.

Variation. Mid-body scale-rows 17. Ventrals 164–171. Subcaudals 24–27. Except that they have fewer ventrals than West African examples, the present series of five males conforms to the description of *C. unicolor* as given in the Catalogue of Snakes, iii, p. 245.

Relationships. We have carefully compared the specimen of *C. polylepis* from Lumbo, Mozambique,[1] with the present series and find that it is identical with them in all respects except in having 19 scale-rows. Boulenger[2] states of *C. polylepis* that it is 'in every respect like *C. unicolor* except that the scales are in 21 rows.' Tornier[3] has recorded specimens with 17, 19 and 21 rows from the Tanga-Usambara region, and elsewhere the junior author[4] has reported on a

[1] Loveridge, 1923, Proc. Zoöl. Soc. Lond., p. 889.
[2] Boulenger, 1896, Cat. Sn. Brit. Mus., **3**, p. 246.
[3] Tornier, 1901, Zool. Jahrb. (Syst.), **14**, p. 85.
[4] Loveridge, 1923, Proc. Zoöl. Soc. Lond., p. 889.

specimen, probably taken in the Morogoro-Uluguru region, with 19 scale-rows. As the distribution in East Africa appears identical for snakes with 17, 19 or 21 rows, we appear to be dealing with a single species and therefore refer *C. polylepis* to the synonymy of *C. unicolor*.

Not having examined the type of Schmidt's *C. niangarae* from Niangara, Congo Belge,[1] we hesitate to place it in the synonymy of *C. unicolor*, where, to judge from the description alone, one would imagine that it should go, for it is apparently a male of that species.

Coloration in life. Uniformly iridescent black, some individuals opaque grey, the latter presumably about to slough though showing no other indications of it.

I had intended inviting attention to the extraordinary superficial likeness of this snake to the very venomous *Atractaspis irregularis* which occurs in the same localities, but in referring to the literature I find that Tornier has already placed *Atractaspis hildebrandtii Peters* in the synonymy of *C. unicolor*, and the fact that Boulenger referred a specimen of *unicolor* to *hildebrandtii* is eloquent proof of the similarity.

Measurements. The largest of these five males measures 472 (430 + 42) mm.

Diet. A Nyange snake had eaten a *Lygosoma kilimensis*. One Amani reptile had an *Aparallactus werneri* in its stomach, and another a *Boulengerula boulengeri*.

Habitat. One was hoed up in a garden at Nyange; the Amani specimens were taken in the clearing of land.

Aparallactus werneri Boulenger

Aparallactus werneri Boulenger, 1895, Ann. Mag. Nat. Hist., (6) **16**, p. 172.

1 (M. C. Z. 23371) Bagilo, Uluguru Mtns., 28. ix. 26.
1 (M. C. Z. 23372) Vituri, Uluguru Mtns., 19. x. 26.
1 (M. C. Z. 23373) Mkarazi, Uluguru Mtns., 23. x. 26.
43 (M. C. Z. 23374–406) Amani, Usambara Mtns., xi–xii. 26.
1 (M. C. Z. 23408) Kizerui, Usambara Mtns., 8. xii. 26.
1 (M. C. Z. 23409) Mt. Lutindi, Usambara Mtns., 10. xii. 26.
1 (M. C. Z. 23410) Bumbuli, Usambara Mtns., 14. xii. 26.

Variation. The interesting point about this species is its remarkable constancy to type. In the whole series there are only three minor variations, viz., nasal enters eye on right side in No. 23393; there are 1 prae- and 1 postocular on right side of head and 1 prae- and 2 postoculars on left side of head in No. 23405; the symphisial is well in contact with the anterior chin-shields in No. 23406. Otherwise every specimen is true to type in the number of scale-rows, anal, labials, position of labials beneath eyes, temporals and symphisial.

[1] Schmidt, 1923, Bull. Am. Mus. Nat. Hist., 49, p. 117, fig. 12.

The ventrals range from 141 to 163. Subcaudals 32–45.

In 16 males the ventrals range from 141 to 151. Subcaudals 35–45.

In 33 females the ventrals range from 146 to 163. Subcaudals 32–42.

Coloration in life. ♂ Bagilo. Above, head and neck (for seven scale-rows behind parietals) iridescent black, followed by a narrow band (two scale-rows wide) of yellow, rest of the body olive-brown, each scale edged all round with black; a yellow spot on the first, fourth, fifth and sixth upper labials. Below, bright yellow, slightly darker on tail.

♀ Amani. Above, head and neck black, more or less separated by a narrow yellow collar, rest of upper surface bright green with a reticulation of fine black lines caused by each scale having black edges. Below, chin white, throat yellowish, rest of under surface very bright yellow. Before sloughing uniformly grey above and dirty white below. 27. xi. 26.

Measurements. Largest male measures 333 (305 + 28, tip missing) mm.; largest female 354 (295 + 59) mm. Both Amani.

Breeding. Seventeen females examined at Amani in November had large, well-developed, very elongated eggs. Seven had two eggs; eight had three; and two had four. Those with two eggs were usually rather small snakes, but the largest eggs, measuring 39 × 6 mm. on 25. xi. 26., were in one of these. Apparently females are more numerous than males if one can judge on a basis of 49 snakes of which only 16 were males.

Diet. A Vituri and three Amani snakes had each eaten a centipede.

Enemies. A Werner's Black-headed Snake was recovered from the stomach of a *Calamelaps unicolor.*

Habitat. Taken beneath logs, bark and stones, both within and without the rain-forest. Some were unearthed by hoeing up grass and weeds on the outskirts of the forest. In fact its habitat is almost identical with that of the North American Ring-necked Snakes (*Diadophis* spp.) which it so closely resembles in colour, markings and size.

Aparallactus uluguruensis sp. n.

3 (M. C. Z. 23363–65) Nyange, Uluguru Mtns., 1–6. x. 26.
7 (M. C. Z. 23366–70) Amani, Usambara Mtns., xi–xii. 26.

Type. No. 23363. Museum of Comparative Zoölogy. Sex ♂. From Nyange, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 1st, 1926.

Paratypes. Nos. 23364, 23365, 23366–70 and two duplicates.

Affinities. Both by its size and colour this would appear to be a southerly representative of *A. concolor* though structurally far more like *A. guentheri* Blgr., of which it is certainly no close relative.

Diagnosis. Differs from *concolor* in that *the visible portion of the rostral is only a third its distance from the frontal*, the nasal being in contact with the praeocular, the second supralabial separated from the praefrontal, symphisial in contact with anterior chin-shields, and *only three lower labials in contact with anterior chin-shields.*

It differs from *guentheri* in those characters which are emphasized above by italics, also in the undivided (rarely divided) nasal, the anterior chin-shields being much longer than the posterior, and in the entirely different colouring, habit and size.

Description. Diameter of eye greater than its distance from the oral margin. Rostral broader than deep, the portion visible from above equal to one-third its distance from the frontal; internasals shorter than the praefrontals; frontal once and a half as long as broad, much longer than its distance from the end of the snout, a little shorter than the parietals; nasal entire (rarely divided), in contact with the praeocular; one postocular; temporals 1 + 1; seven upper labials, third and fourth entering the eye, fifth in contact with the parietal; symphisial in contact with the anterior chin-shields, which are longer than the posterior and in contact with three lower labials (in two of the paratypes the division of an anterior lower labial on the right side only has taken place so that on this side there are four lower labials in contact with the anterior chin-shield). Scales in 15 rows. Ventrals 144 (137–159); anal entire; subcaudals 51 (45–58).

Coloration. Plumbeous or iridescent black above; paler beneath, particularly on throat and under surface of tail, which are almost white.

Measurements of Type ♂.		*Paratypes*	
Total length	360 mm.	The largest paratype male measures	400 mm.
Length of head and body	285 "	(320 + 80)	
Length of tail	80 "	Largest female	401 "
Diameter at mid-body	10 "	(325 + 76)	

Diet. Six centipedes of two species (*Alipes grandidieri* and another which is preserved) were recovered from their stomachs. In one Nyange snake, besides two centipedes there was a snail.

ELAPIDAE

Elapsoidea guentheri Bocage

Elapsoidea guentheri Bocage, 1866, Jorn. Sci. Lisboa, **1**, p. 70, Pl. I, fig. 3.
Elapsoidea nigra Günther, 1888, Ann. & Mag. Nat. Hist. (6) 1, p. 322 (Ushambola, Zanzibar).

5 (M. C. Z. 23411–5) Nyange, Uluguru Mtns., 1–11. x. 26.
39 (M. C. Z. 23417–54) Amani, Usambara Mtns., xi–xii. 26.
3 (M. C. Z. 23455–7) Bumbuli, Usambara Mtns., 16. xii. 26.

Variation. Mid-body scale-rows 13. Ventrals 153–162. Anal single. Subcaudals 13–23. Certain specimens show here and there one or more of the paired subcaudals fused into a single shield. Praeocular 1. Postoculars 2, except in No. 23413 where there is only a single shield. Temporals 1 + 2, except in Nos. 23424, 23427, and 23435, which have an extra small scale between the anterior temporal and the lower postocular on both sides. In No. 23441 this is the case on the right side only. Usually 4 lower labials in contact with the anterior chin-shields; only eight specimens in the series have 3 lower labials in contact and then usually on one side only. There is absolutely nothing in the key-character based on the comparative length of the internasals and praefrontals to separate *E. nigra* from *E. guentheri;* in the present series the internasals range from less than half to seven-eighths the length of the praefrontals.

Coloration in life. Above, highly polished iridescent black, with or without transverse white bars. In some apparently entirely black adults the reptile will, on being disturbed, inflate its lungs and thereby suddenly bring into prominence the hitherto concealed white bars. Below, usually uniformly iridescent-black, paler, or even white, upon the throat; very rarely there are a few white patches in the middle of the ventrals.

Young specimens show a series of broad black bands (these are just a little blacker than the ground colour) narrowly edged with white on both sides. *E. guentheri*, as known to the junior author at Nairobi, is banded with pink and black or red and black in life, and it is difficult to believe that it is the same species as the series before us, yet colour seems to be the only ground on which the two reptiles can be distinguished. The species is obviously extremely variable in coloration.

Furthermore, there is in the collection of the Amani Institute a snake collected at Amani, 20. v. 1907, which appeared to me to be of the red-banded type, though I may be mistaken. In 1910 Nieden lists *E. guentheri* as occurring at Amani, though whether his specimens were identical with what have heretofore been called *E. nigra* it is impossible to say.

Measurements. Largest male measures 544 (507 + 37) mm.; largest female 569 (530 + 39) mm. Smallest snake, a male taken 22. xi. 26., measures 264 (245 + 19) mm. All from Amani.

Habitat. Found in clearing land or amongst heaps of rubbish within or without the rain-forest. I encountered several moving along the paths in the rain-forest between noon and 3 P.M.

Temperament. By no means a vicious snake; if gently handled it makes no attempt to bite. Wholly black specimens with their small heads, scarcely larger than the body, are sufficiently like an *Atractaspis* viper in life so that they are not to be readily distinguished.

Breeding. A Nyange female on 1. x. 26 had two enormously elongated eggs 40 × 10 mm. in the oviducts. Four Amani snakes examined on 29–30. xi. 26 had 2, 3, 4 and 4 eggs respectively, the largest of which measured only 27 × 10 mm. The two Bumbuli females taken 16. xii. 26. held 4 and 5 eggs; those of the latter series measured 37 × 12 mm.

Diet. At Amani this species seems to subsist largely on the caecilian *Boulengerula boulengeri* as the following records show. Snake taken at 8 A.M. on 20. xi. 26. had a perfect undigested caecilian in its stomach. Another taken at 3 P.M. the same day held one with only the head digested, the skull being nicely cleaned. On 22nd another snake had the head and forepart of a caecilian in its stomach. On 30th three caecilians were recovered from the stomachs of two snakes, one having swallowed two.

Parasites. A mass of tapeworms (*Ophiotaenia elapsoideae* sp. n. and *Ophiotaenia* near *O. mönnigi*) in the stomach of a Nyange snake examined 1. x. 26., and in another taken 11. x. 26; also abundant in an Amani snake collected 23. xi. 26. Nematodes (*Kalicephalus* sp.) and cysts in stomach of an Amani snake on 25. xi. 26., and nematodes in another taken 29. xi. 26.

Mites under ventrals of Amani snake No. 23445.

VIPERIDAE

Causus defilippii (Jan)

Heterodon defilippii Jan, 1862, Arch. Zoöl. Anat. Phys. **2**, p. 225.

2 (M. C. Z. 23458–9) Nyange, Uluguru Mtns., 11. x. 26.
Kinangananga in Kikami, a specific name.

Variation. Except that one of these females has 2 + 2 temporals, in lieu of 2 + 3, these specimens are normal. Mid-body scale-rows 17. Ventrals 118–120. Subcaudals 19.

Bitis arietans (Merrem)

Vipera (*Echidna*) *arietans* Merrem, 1820, 'Tent. Syst. Amphib.' p. 152.

1 (M. C. Z. 23463) Dar es Salaam, 8. xi. 26.

Known to both Wakami and Wasumbara as *moma*, a name the latter also apply to the Gaboon Viper.

It is interesting to note that this species, so common in the savannah country of Africa, and even on the lower slopes of the Uluguru Mtns. at Morogoro, is said by the Wakami not to occur in the mountains.

Bitis gabonica (Duméril et Bibron)

Echidna gabonica Duméril et Bibron, 1854, 'Erpét. Gén.,' **7**, p. 1428, Pl. LXXX, fig. b.

3 (M. C. Z. 23460–1) Amani, Usambara Mtns., xi.–xii. 26.
1 (M. C. Z. 23462) Kiserui, Usambara Mtns., 8. xii. 26.

Moma in Kisumbara, not specific as also applied to the Puff Adder.

Distribution. This species does not occur in the Uluguru Mtns. The local chief at Kizerui assured me that *Bitis arietans* is also to be found near his village. As I was there only for one rather rainy day I was unable to verify this but it would be interesting to know if the two species occur in the same habitat. At Amani the Puff Adder is found a thousand feet lower down in the Sigi country.

Variation. Mid-body scale-rows 28–44. Anal single. Subcaudals 20–33. Labials 13–15, all of which are well within the recognized limits of variation for this species.

Measurements. When freshly killed the largest of these four females measured 49 inches or 1160 (1083 + 77) mm., which is very little under the maximum recorded by Boulenger.

Diet. This large female had a Byatt's Squirrel (*Aethiosciurus byatti*) in its stomach; another Amani snake, a rat (*Rattus* sp.). The Kizerui reptile had also eaten a rat (*Lophuromys aquilus aquilus*).

Parasites. A cestode (*Ophiotaenia gabonica* (Beddard)) was taken from the stomach of the large Amani viper.

Atheris ceratophorus Werner

Atheris ceratophorus Werner, 1895, Verb. Zool.-bot. Ges. Wien, **45**, p. 194, Pl. V, fig. 1.

1 (M. C. Z. 23464) Amani, Usambara Mtns., xii. 26.
1 (M. C. Z. 23465) Kizerui, Usambara Mtns., 8. xii. 26.

Variation. Both males; the type was a female. Rostral a little more than twice (not two and a half times) as long as broad; 8–9 (10–11 in type) scales

across the interorbital region; 3–5 (3 in type) enlarged horn-like supraciliary scales. In the Kizerui snake there are only 9 upper labials and only 3 lower labials in contact with each chin-shield. Both have 21 (not 25 as in type) scale-rows. Ventrals 144–152 (142 in type). Subcaudals 41 + and 56 (Type 55).

Coloration. While the Kiserui reptile agrees with the type in its markings and dark olive colour, the Amani snake is without the markings and is a paler, more yellowish, green.

Measurements. Largest male (Kizerui) measures 422 (342 + 80) mm.

Diet. An arboreal frog, apparently *Hyperolius* sp., was recovered from the stomach of the Kizerui snake.

Habitat. The natives informed me that these snakes are found in grass or low bushes at a height of three or four feet from the ground. A European told me, to my surprise, that he had often seen horned *Cerastes* (*sic*) vipers in the grassy plains of the Kondoa-Irangi district. This lies within the known range of the species but is an unlikely habitat, if correct.

Atractaspis rostrata Günther

Atractaspis rostrata Günther, 1868, Ann. Mag. Nat. (4) **1**, p. 429, Pl. XIX, fig. 1.

3 (M. C. Z. 23466–8) Nyange, Uluguru Mtns., 11. x. 26.
1 (M. C. Z. 234669) Mkarazi, Uluguru Mtns., 22. x. 26.
1 (M. C. Z. 234670) Dar es Salaam, 4. xi. 26.

Variation. Mid-body scale-rows 21–23 (one Nyange snake and the Mkarazi specimen have 21, the others 23 rows). Ventrals 235–276 (the previous recognized range was 227–248). Subcaudals 21–26. In every other detail they agree precisely with the description.

Coloration. Three distinct types of coloration are represented. The tongue is white. (1) Uniformly iridescent black above and below (Nyange). (2) Opaque or slaty grey above, lighter below. This snake is presumably about to slough (Nyange). (3) Brown above, pure white below (Dar es Salaam).

Measurements. Largest male measures 581 (542 + 39) mm.; largest female measures 559 (525 + 34) mm. Both from Nyange.

Diet. The last-mentioned snake had in its stomach a blind snake (*Typhlops braminus*), the head and foreparts of which were in good condition, the rest digested.

Habitat. I found the Mkarazi snake at 9 A.M. beneath a very large flat boulder in a field of stubble; the Dar es Salaam reptile at 11 A.M. under a pile of leaves and sweepings in the Botanical Gardens in the centre of the town.

Venom. A small boy, about eight years of age, was bitten on the finger by the smallest snake, which was only 323 mm. long. When I arrived at the place two days afterwards, he had a very swollen hand and wrist but it subsided on the third day. The only treatment he received was a bread poultice which I applied on the evening of the second day to ease his mind as much as anything.

GEKKONIDAE

Paragonatodes africanus (Werner)

Gymnodactylus africanus Werner, 1895, Verh. Zool. bot. Ges. Wien, **45**, p. 190, Pl. V.

1 (M. C. Z. 24011) Vituri, Uluguru Mtns., 27. x. 26.
13 (M. C. Z. 24012–21) Amani, Usambara Mtns., 20–29. xi. 26.
1 (M. C. Z. 24022) Kizerui, Usambara Mtns., 8. xii. 26.
3 (M. C. Z. 24023–5) Mt. Lutindi, Usambara Mtns., 10. xii. 26.
2 (M. C. Z. 24026–7) Bumbuli, Usambara Mtns., 15. xii. 26.
Eggs (M. C. Z. 24028) Phillipshof, Usambara Mtns., 21. xii. 26.
2 (M. C. Z. 24029–30) Kwai, Usambara Mtns., 24. xii. 26.

Variation. These agree with the type very closely; occasionally there are 8 or 9 supralabials (6–7 in type series); the three chin-shields bordering the mental behind appear to be a constant feature. Three of the five males have 10 praeanal pores, the fourth 11, the fifth (Vituri) 13.

Relationship. We are indebted to Dr. G. K. Noble for making a comparison of one of the above topotypic specimens with the genotype of his new genus Paragonatodes. He writes:

> I find that the species is undoubtedly referable to Paragonatodes. A number of small differences appear. Thus I find rudiments of a second epibranchial present. The pelvis, hyoid, shoulder girdle, and other structures come within the limits of Paragonatodes.

Coloration in life. Amani female. Above, blackish with greyish-green markings; a chain of these down the back are rather like a series of ornamental A's; in some individuals these coalesce to form a pale-fawn vertebral line with paired stripes at right angles to it, formed from the feet of the A. In specimens taken on green tree-trunks the green increases and brightens to olive. Labials dusky with pale-yellow spots, many inconspicuous yellow specks on sides of head, neck and limbs. Below, throat white with three dusky ∧-shaped markings diminishing in size towards the centre; breast, belly, and underside of limbs yellowish-green or yellowish-white, under-surface of tail bright reddish-orange.

In males the gular ∧-shaped markings appear to be a more constant feature; a series of them, one within the other, follows the outline of the lower jaw.

Measurements. Largest male (Amani) measures 101 (47 + 54) mm.; the largest female (Kwai) is 119 (54 + 65) mm. The smallest specimen, a female taken on 15. xii. 26 which has part of its tail missing, measures 24 mm. in length of head and body.

Breeding. At Amani six eggs, each measuring 9 × 8 mm., were found in the rotten wood of fallen logs, the adults being collected at the same place and time, viz., 22. xi. 26. As in most geckos, only two eggs are produced at a time, the pair of eggs being visible in several of the females captured. These differ from those of the genus *Lygodactylus, Hemidactylus mabouia* and many other species in not being stuck together. At Phillipshof, on 21. xii. 26, my attention was attracted to a hole in a bank in the forest by a snake's cast skin and a number of broken egg-shells about the entrance. After opening up the passage I raked out the loose soil at the terminus and found no fewer than thirty-one whole eggs of *Paragonatodes africanus.*

Diet. An ant in one and a cockroach in another.

Distribution. This lizard is recorded for the first time from the Uluguru Mtns., where it is decidedly rare. It has been recorded from Mt. Meru by Lönnberg and from Mt. Kenia by Tornier. It is evidently a species definitely associated with mountain rain-forest.

Habitat. At Amani four adults were collected in the rotten wood of fallen logs where their eggs were found. On three occasions in as many days I saw them on the trunks of living trees but in each instance the tree had a decayed interior into which the gecko retired. They emerge about 5 P.M., sunset being at 6 P.M. In shady forest they may be seen on the trees at almost any hour.

Four or more were seen one afternoon as I was walking through the forest from Misalae to Kizerui. One was on the brink of a large pool in the forest. On my approach, it took to the water without the slightest hesitation and swam out to a piece of floating bark. As I very quietly took another step in its direction, it jumped off its raft and struck out boldly across the six feet of water to the opposite bank, which it gained before I did. Had it not paused to rest on landing, I should not have caught it. The species squeaks loudly when captured.

At Lutindi three were taken on tree-trunks or under logs. A very young one was captured on the whitewashed outer wall of one of the Mission buildings at Bumbuli. The second was taken on a rock. This was very interesting, for the forest at Bumbuli has been cut back to a mere cap along the crest of the hills; it is very dry and no longer rain-forest, and it appears as if the gecko is attempting to adapt itself to other environments. At Lushoto much of the original forest

has been cleared away and acres planted with eucalyptus. A *Paragonatodes* crossed the path as I was walking through one of these extensive plantations, and when I stooped to intercept it, the gecko sprang or leaped to the trunk of one of the trees and made good its escape.

Hemidactylus mabouia (Moreau de Jonnès)

Plate **4**, figs. 2 & 4.

Gecko mabouia Moreau de Jonnès, 1818, Bull. Soc. Philom. Paris, p. 138.

1 (M. C. Z. 24031) Bagilo, Uluguru Mtns., 15. ix. 26.
1 (M. C. Z. 24032) Nyange, Uluguru Mtns., 1. x. 26.
1 (M. C. Z. 24033) Bagamoyo, 11. xi. 26.
1 (M. C. Z. 24034) Tanga, 15. xi. 26.
3 (M. C. Z. 24035–7) Amani, Usambara Mtns., 25. xi. 26.
Eggs (M. C. Z. 24038) Amani, Usambara Mtns., 26. xi. 26.
1 (M. C. Z. 24039) Soni, Usambara Mtns., 18. xii. 26

Also seen, or captured as snake food, at Nyingwa (near foot of mountain), Mkangazi, Vituri, Dar es Salaam, Muheza, Kerogwe, Kizerui, Mt. Lutindi (at very foot of mountain).

Kimbulubulu in Kikami, *chungula* in Kisumbara, *mjusi kafiri* in Kiswahili.

Breeding. Paired eggs were found in the bark of a coconut palm at Dar es Salaam on 4. x. 26.; they contained well-developed embryos. A female was shot from beside a pair of eggs stuck to a cliff-face at Amani, 26. xi. 26. These eggs measured 13 mm. in diameter.

Diet. Big spider in stomach of a Bagilo female. A cockroach was disgorged by a gecko caught at Vituri.

Parasites. Nematodes of the family Physalopteridae were taken in a Bagamoyo specimen.

Habitat. Nearly all these geckos were taken on the trunks of large, usually hollow, trees. At Amani, where they are not as plentiful as one would expect, they also occur in the houses.

Folklore. The Wakami say that if this lizard's faeces fall upon one's clothes, the stain will not come out.

Enemies. Salimu reported having seen a Mountain Kestrel (*Falco tinnunculus carlo*) drop down from the air and pick a lizard off a rock. I sent him to shoot the bird and from its crop we recovered the remains of a *Hemidactylus mabouia*.

Hemidactylus persimilis sp. n.

Plate **4**, figs. 1 & 3.

Hemidactylus mabouia (part) Loveridge, 1923, Proc. Zoöl. Soc. Lond., p. 936, Mbala record; p. 937, paragraphs 1 and 7 only.

1 (M. C. Z. 24040) Bagilo, Uluguru Mtns., 14. ix. 26.
Eggs and 14 (M. C. Z. 24041–9) Dar es Salaam, 9. xi. 26.

Type. No. 24041 Museum of Comparative Zoölogy. Sex ♂. Dar es Salaam, Tanganyika Territory. Collected by A. Loveridge, November 9th, 1926.

Paratypes. Rest of the series mentioned above and those enumerated below.

Affinities. Almost indistinguishable from immature specimens of *Hemidactylus mabouia.*

Diagnosis. Differs from *H. mabouia* in having 5–6 lamellae under the median digit instead of 7–9. When fully grown and breeding it measures only 103 mm., while *H. mabouia* attains to 188 mm. The egg of this species measures 8 to 8.5 mm. in diameter, that of *H. mabouia* from 12 to 13 mm. (An earlier record by the junior author gives 10 to 12 mm. but the specimens are not available for checking and identifying the 10 mm. specimens.)

Description. Characters as in *H. mabouia* with a tendency to have fewer scales everywhere. Thus supralabials 10 (in *mabouia* 10–14), infralabials 8–9 (in *mabouia* 9–10), praeanal pores 9–15 on either side (in *mabouia* 15–30), lamellae under median digits 5–6 (in *mabouia* 7–9). Specimens with regenerated tails often have a transversely enlarged median series of scales. The tubercles are more numerous than in East African specimens of *H. mabouia* but not more so than in certain West Indian examples which we have examined; these tubercles also appear to be more sharply conical but this character again breaks down when a large series is examined. One gecko (M. C. Z. No. 1327) from Port au Prince, Haiti, has only six subdigital lamellae under the median digit.

Coloration. As in *H. mabouia* and varying with the environment.

Measurements of Type ♂.		*Paratypes*
Length of head and body	47 mm.	The largest male (Bagilo) measures 104 mm. (53 + 51)
Length of tail regenerated	40 "	
Length of hind limb	9 "	
Width of head	9 "	
Width of body	9 "	

Distribution. Occurs along the East African coast from Mombasa to Mozambique and in Tanganyika Territory inland to Kilosa, which is also zoölogically in the coastal belt. Its distribution will probably be found to coincide with that of the coconut palm and, like *Phelsuma*, it will doubtless have been introduced to the islands off the coast by dhows which are thatched with palm fronds. The undermentioned specimens in the collection of the Museum of Comparative Zoölogy have been examined and are named as *paratypes.* The whole series of *H. mabouia* from Africa, the West Indies, Central and South America have also been examined but, with the one exception cited, they agree in having 7 or more lamellae under the median digit, usually six pairs and one single terminal lamella.

2 eggs (M. C. Z. 18431) Morogoro, Tanganyika Territory, 11. iv. 18.
7 (M. C. Z. 18515–7) Kilosa, Tanganyika Territory, 1921–23.
2 (M. C. Z. 18524–5) Mbala, Tanganyika Territory, 26. ii. 23.
4 (M. C. Z. 22978–81) Morogoro, Tanganyika Territory, 1916–1917.
4 (M. C. Z. 22982–5) Lumbo, Portuguese East Africa, vii–viii. 18.
1 (M. C. Z. 22986) Frere Town, Kenya Colony, 31. xi. 22.

Hemidactylus mabouia also occurs in all the above-mentioned localities and in no way affects the junior author's previous records except in the case of Mbala cited above.

Breeding. About two-score eggs were collected among rotting palm-leaves and piles of palm-thatching near native villages on the outskirts of Dar es Salaam. It was the fact that there were no adult *H. mabouia* to be found among these leaves that caused me to wonder if the abundant 'half-grown *H. mabouia*' haunting these piles had not some connection with the eggs. After catching a dozen of them it was discovered that *they were not half-grown* but fully adult specimens, eggs being clearly visible through the semi-transparent abdominal walls of the females. These eggs agreed in size with those found among the palm-fronds but differed considerably from those found in houses or in fissures in the bark of big trees.

Diet. A Tineid moth in the stomach of the Bagilo gecko.

Habitat. Besides the commonest habitat already mentioned, at Bagilo I saw ten of these geckos basking in the company of three Striped Skinks along a crack in the face of a wall of rock. They were at a height of twelve feet from the ground and all were black as the cliff itself, which was covered with some dark lichen.

Hemidactylus tropidolepis Mocquard

Hemidactylus tropidolepis Mocquard, 1888, Mem. Cent. Soc. Philom., p. 113.

2 (M. C. Z. 26649–50) Near Kilindini, Kenya Colony, 3. v. 26.

Relations. The material consists of a very young and an adult female of the same body length as Mocquard's male type. The adult was submitted to Mr. H. W. Parker for the favour of comparing it with types of related species in the British Museum. He writes:

'I have compared this specimen with the types of various spp. as follows; it differs from

(*a*) *isolepis* in the smaller dorsal scales which are somewhat keeled and in the presence of scattered enlarged tubercles on the occiput.

(*b*) *homoeolepis* in the larger dorsals, keels on the dorsals and the larger scales on the snout.

(*c*) *Bunoenemis modestus* in the slightly keeled and striated dorsals which are unequal in size.

'Boulenger writing of *isolepis* says "*H. tropidolepis* Mocquard . . . appears . . . to approach *Bunoenemis modestus* . . . but differs in the keeled dorsal scales." Your specimen seems to agree very well with Mocquard's description.'

Nieden [1] has united *H. squamulatus* Tornier of Tanganyika Territory with *H. tropidolepis* which was described from Somaliland.

Variation. Three, instead of two, pairs of chin-shields, the third pair very small. The keeled scales on the back are apparently less numerous than in the type.

Measurements. ♀ total length 70 (37 + 33) mm. Young, 40 (23 + 17) mm.

Diet. Six termites and a grasshopper's leg were recovered from the stomachs of these specimens.

Habitat. Taken on a creeper-covered tree-stump in the middle of a native clearing. The stump was the centre of a rank growth of weeds which had to be cleared away before the geckos could be captured.

Lygodactylus fischeri Boulenger

Lygodactylus fischeri Boulenger, 1890, Proc. Zoöl. Soc. London, p. 80, Pl. VIII, f. 1.

1 (M. C. Z. 24063) Vituri, Uluguru Mtns., 30. x. 26.
1 (M. C. Z. 24064) Mt. Bomoli, Amani, Usambara Mtns. 2. xii. 26.
8 and eggs (M. C. Z. 24065–73) Phillipshof, Western Usambara Mtns. 21–23. xii. 26.
9 (M. C. Z. 24074–8) Kwai, Western Usambara Mtns. 24. xii. 26.

Relations. Müller [2] after examining a series of Cameroon specimens of *L. fischeri* Blgr, a species described from Sierra Leone, found their range of variation included *L. conradti*, which Matschie described from Derema, Usambara, in 1892. Nieden [3] agrees with this and adds *L. fischeri schefflleri*, which was described by Sternfeld from Kibwezi, Kenya Colony, to the synonymy. The examples from Mbunyi, Kenya Colony, and Bagilo, Uluguru Mountains, referred to *schefflleri* by the junior author [4] must be considered *fischeri* if the East African race is invalid. None of the specimens taken outside the Usambara range approach the size of those captured in these mountains. If the types of *schefflleri* were full grown (24 and 27 mm. snout to vent) they were much smaller than the mountain geckos, which attain 42 mm. ♂, and 39 mm. ♀, snout to vent measurements at Phillipshof.

Variation. The following variations of the Usambara series are compared with the type of *L. conradti* and the results fall within the range of variation of West Coast *fischeri*.

[1] Nieden, 1913, Mitt. Zool. Mus., Berlin, **7**, p. 66.
[2] Muller, 1910, Konig Bayr. Akad. Wiss. Munich, **24**, p. 558.
[3] Nieden, 1915, Mitt. Zool. Mus. Berlin, **7**, pp. 67–68.
[4] Loveridge, 1920, Proc. Zoöl. Soc. London, p. 136, and 1923, Proc. Zoöl. Soc. London, p. 940.

Supralabials 5–8 (four sides with 5, seven with 6, twenty-three with 7, three with 8; type was described with 8), sublabials 5–7 (two sides with 5, twenty-five with 6, nine with 7; type had 7); three specimens have the nostril between 3 (instead of 2) scales and the rostral and first labial. Tornier has stated that the male has 7 praeanal pores; this is the case with only two of the males in the present series, the remaining eight having 8 pores. The double row of transversely enlarged subcaudals is not always well defined; on reproduced tails the scaling is very irregular; in one specimen there are narrow transversely dilated plates but usually the under surface is covered with scales of various sizes without definite arrangement. The tail of this gecko is large and swollen, differing in this respect, as well as in the readiness with which it is dropped, from those of other members of the genus. The reproduced half of the tail of the Vituri gecko has very irregularly enlarged plates, but the majority are single, not paired as in the intact basal portion.

Coloration. The Usambara adults are practically the same as described by Matschie: those collected on banana plants at Phillipshof are yellowish-grey, those under logs and rocks at Kwai are blackish-grey. The males are bright yellow or orange beneath (I omitted to take down exact color notes at the time), probably like the young Bomoli gecko of which I noted that it had the under side of the stomach and hind limbs bright yellow, and the under surface of the tail orange. Some adults have a very few scattered spots beneath. Two of the Kwai females have a broad, dark-edged, fawn stripe from the posterior border of the eye to the tail, where it merges with the stripe from the opposite flank; in this they agree with the Bomoli young one. Newly emerged geckos are spotted on throat and flanks exactly like the specimen from Vituri; above they are uniformly dark plumbeous.

The coloration of the Vituri gecko agrees, in its spotted under surface, with the specimen recorded from Bagilo by the junior author. They show no yellow or orange below, nor did the Mbunyi examples mentioned above.

Measurements. The largest male measures 80 (39 + 51) mm., another with reproduced tail measures 42 mm. from snout to vent; the largest female 87 (39 + 48) mm. This is therefore 37 mm. longer than the type of *conradti*, which was presumably a female. It will be seen that in the matter of size this *Lygodactylus* stands alone among East African members of the genus. On hatching, a young gecko measures 28 (15 + 13) mm.

The Vituri male measures 59 (34 + 25) mm., but its tail is regenerated.

Breeding. An egg, measuring 7 × 5 mm., was found beneath a log on Bomoli, 20. xi. 26. At Phillipshof I was walking up the road in the evening of 21. xii. 26.

when I noticed about half-a-dozen pairs of eggs lying on the bare soil of the somewhat broken-away bank at the side of the road. I speculated as to whether these had been laid in trees above and fallen, yet none were broken and none were to be seen except at the one restricted spot. Then I examined the roots, exposed by recent rain, of a large tuft of grass on the edge of the bank; here to my astonishment I unearthed forty-five pairs of eggs, making a total of fifty-one clutches. They were all apparently fresh and recently laid; how came fifty-one lizards to this spot to lay? Though I searched the vicinity, no geckos were to be found; doubtless they were concealed in hollow tree-trunks. The nearest were collected on banana plants two miles away!

Diet. Ants, and a beetle, cockroach, and spider were discernible among the stomach contents of the three geckos examined.

Parasites. Red acarine parasites are of frequent occurrence in the anal region and about the praeanal pores.

Habitat. I caught the eight Phillipshof geckos among the basal stalks of the leaves of wild bananas growing on an open hillside. They displayed great agility in springing from leaf to leaf. The Kwai series was taken by my native collector 'under logs and rocks at the edge of the forest.' The Vituri gecko was taken on a tree-stump at the forest edge.

Lygodactylus grotei Sternfeld

Lygodactylus grotei Sternfeld, 1911, Sitzber. Ges. Naturf. Freunde Berlin, p. 245.

Eggs (M. C. Z. 24056) Mkarazi, Uluguru Mtns., 23. x. 26.
1 (M. C. Z. 24055) Vituri, Uluguru Mtns., 30. x. 26.
10 and eggs (M. C. Z. 24057–60) Dar es Salaam, 9. xi. 26.
Eggs (M. C. Z. 24061) Tanga, 15. xi. 26.
1 (M. C. Z. 24062) Bumbuli, Usambara Mtns., 14. xii. 26.

Coloration. There is no mention of the following points in the original description. The throats of both the Dar es Salaam males are more or less dark, with a light ∧-shaped or ∩-shaped marking in the centre. A light vertebral line is frequently, but by no means always, present.

Measurements. The largest male measures 108 (54 + 54) mm.; the largest female 65 (34 + 31) mm.

Breeding. Two eggs were found inside the outer dried leaf of a banana stem, two more beneath a large stone in the same 'field'; that the second pair are the eggs of *L. grotei* is only by inference, as the situation seems improbable for *L. p. picturatus.* They contained embryos on the point of hatching.

A series of eggs collected at Dar es Salaam on 9. xi. 26 were taken among piles of coconut palm fronds adjacent to banana plants on which the adults were

collected. One or two pairs of eggs were also found among the withered outer leaves of the bananas.

Four pairs of eggs were taken at Tanga on 15. xi. 26. Some of these measured 7 × 5.5 mm. and are thus slightly larger than those of *L. p. picturatus* hitherto recorded. One pair hatched out the same day they were collected; the emerging geckos measured 25.5 (13.5 + 12) mm.

Diet. I observed one gecko stalk, and spring upon, a cockroach which was on the main stem of a shrub occupied by the lizard.

Habitat. Besides the Dar es Salaam geckos, the Vituri specimen was also taken on a banana stem. The Bumbuli female was basking in the rays of the setting sun low down on the stem of a shrub in the Mission grounds. It may be remarked that both places were well away from the forest and at no great altitude.

Lygodactylus picturatus picturatus (Peters)

Hemidactylus picturatus Peters, 1870, Monatsber. Akad. Wiss. Berlin, p. 455.

1 (M. C. Z. 24050) Nyange, Uluguru, Mtns. 1. x. 26.
1 (M. C. Z. 24051) near Mkarazi, Uluguru Mtns., 23. x. 26.
6 (M. C. Z. 24052) Dar es Salaam, 4. xi. 26.
1 (M. C. Z. 24053) Bagamoyo, 11. xi. 26.
2 (M. C. Z. 24054) Tanga, 15. xi. 26.

Variation. The female from Mkarazi has 7 supralabials on both sides; hitherto 5–6 has been the usual number.

Measurements. The Nyange male far surpasses in size any other example of this species which we have seen; his big head reminds one of old males of *Agama atricollis* or *Lacerta ocellata*. He measures 78 (41 + 37) mm.

Enemies. One was captured and swallowed by a Green Snake (*Chlorophis neglectus*) at Dar es Salaam.

Phelsuma laticauda (Boettger)

Pachydactylus laticauda Boettger, 1880, Zool. Anz. **3**, p. 280.

1 (M. C. Z. 24079) Dar es Salaam, 4. xi. 26.
5 (M. C. Z. 24080–4) Bagamoyo, 11. xi. 26.

Variation. These differ from the original description in the following points. Diameter of eye contained *thrice* in length from snout, taken from anterior border of the eye; the rostral *has* a slight median cleft, nostril pierced between the first labial and three scales (in one specimen 2 scales), occasionally the rostral appears to border it also; 8–11 upper labials; 8–10 lower labials; 7–10 chin-shields (in one lizard an apical chin-shield is formed by division from the rostral); 1–3 scales separate the supranasals; 9–15 femoral pores on each side. Tornier [1] and the

[1] Tornier, 1900, Zool. Jahrb. Syst., p. 588.

junior author [1] have previously commented on similar variations in Zanzibar examples.

Measurements. Largest male measures 137 (65 + 72) mm.; the largest female 117 (54 + 63) mm.

Diet. Ants and beetles in the stomachs of two specimens examined.

Parasites. Red acarine parasites near the anus in one or two geckos.

Habitat. They live in the tops of the palms and are well known to the climbers for coconuts. The Dar es Salaam specimen was taken in long grass, doubtless moving from one tree to another.

AGAMIDAE

Agama mossambica mossambica Peters

Agama mossambica Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 616.

1 (M. C. Z. 24128) Tumvi, foot of Uluguru Mtns., 1. xi. 26.

Konghore in Kikami.

Coloration, and correction. The junior author, having reëxamined two of the Lumbo, Mozambique specimens (M. C. Z. 13620–1) attributed by him to *colonorum*,[2] finds that they are juvenile *mossambica*. The colour note, and last two paragraphs, therefore, refer to *mossambica* and not *colonorum*.

Distribution. It was interesting to note the complete absence of this common and wide-ranging form in the mountains, where it was replaced by a smaller race. Not one was seen during the seven weeks spent in the Uluguru Range, but an hour's walk down from the camp at Vituri (where the smaller race was common) brought me to Tumvi, where *mossambica typica* graced a great many of the tree-trunks. The male, collected for record, was taken on a baobab.

Agama mossambica montana subsp. nov.

5 (M. C. Z. 24086–90) near Bagilo, Uluguru Mtns., 24. ix. 26.
3 (M. C. Z. 24091–93) Nyange, Uluguru Mtns., 11. x. 26.
3 (M. C. Z. 24094–96) Mkuyuni, Uluguru Mtns., 18. x. 26.
1 (M. C. Z. 24097) Tawa, Uluguru Mtns., 20. x. 26.
5 (M. C. Z. 24098–102) Vituri, Uluguru Mtns., 27–30. x. 26.
15 (M. C. Z. 24103–118) Amani, Usambara Mtns., 19–30. xi. 26.
1 (M. C. Z. 24120) Kizerui, Usambara Mtns., 8. xii. 26.
1 (M. C. Z. 24121) Mt. Lutindi, Usambara Mtns., 10. xii. 26.
6 (M. C. Z. 24122–7) Bumbuli, Usambara Mtns., 14. xii. 26.

Also seen at Muheza and Derema.

All agamas are called *konghore* in Kikami, *kokolwe* in Kisumbara.

[1] Loveridge, 1925, Proc. Zoöl. Soc. Lond., p. 72.
[2] Loveridge, 1920, Proc. Zoöl. Soc. Lond., p. 140.

Type. No. 24189. Museum of Comparative Zoölogy. Sex ♂. From rocks in a native *shamba* one mile below Bagilo on the Bagilo-Nyange path, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge September 24th, 1926.

Paratypes. Thirty-nine specimens as listed above.

Affinities. So closely related to typical *A. mossambica* that it can apparently be separated only on size and colour. All scale-counts appear to overlap.

Diagnosis.

The total length of Peters' male type of *mossambica*	330 mm.
Average of three topotypes (M. C. Z. 1308) though half-tail of one is missing	300
Length of Tumvi specimen (M. C. Z. 24128) listed above	300
Length of largest male *montana*, the type from Bagilo	264
Average of the eighteen largest males from Uluguru and Usambara	245
Average of thirty-nine adults from Uluguru and Usambara	229

It will thus be seen that adults of the two forms may readily be distinguished by the following key:

Total length of adult over 300 mm.	*M. m. mossambica*
Total length of adult under 280 mm.	*M. m. montana*

The typical form inhabits the coastal belt up to 2,000 feet and the mountain race from 3,000 to 5,000; it is probable that intermediates will be found between these altitudes. In appearance those at Muheza, the lowest altitude at which any were seen, looked like *montana;* unfortunately none were collected.

Two examples from Kilosa (M. C. Z. 18273, 18564) mentioned in an earlier paper are referable to the mountain form.

Variation. Praeanal pores in eighteen males range from 8 to 12.

Coloration of Type ♂. Above, olive-brown, most of top and sides of head pale blue; an indistinct band of brick-red across throat from side to side of neck, where it is conspicuous; an irregular in width, but continuous, blue vertebral stripe broadens considerably on the base of the tail but is replaced by brown half-way along the tail; traces of some greenish-blue on the upper arm and thighs, otherwise limbs brown. Below, anterior portion of throat rich ultramarine blue, gradually darkening to form a blackish patch reaching to gular band; rest of under parts, including limbs and tail, creamy-white, a slight pinkish tinge on the breast between the fore arms.

Coloration of Paratypes. The appearance in life was so very varied and handsome that notes were made of all five adult Bagilo agamas taken on the same day.

♂. Above, as in type, but the blue much less distinct and showing many black scales scattered on the head, back and tail; the gular band of type interrupted below, leaving two large splashes of brick-red, one on each side of the

neck. Below, jaws bright blue, the throat between them pinkish; the black patch of type is represented by a smaller pale-green patch; chest to abdomen shows more pink than in type — otherwise they are similar.

(*a*) ♀. Above, mainly golden brown; snout, canthus, supraocular region and around eyes are black; a band of greenish-blue across top of head in front of eyes; the whole of the back part and sides of head, including upper and lower labials, greenish-blue. Below, throat whitish washed with blue, of which there is a small patch in front of collar; beneath chest, belly, limbs and tail, dirty white.

(*b*) ♀. Above, blue on head but not so bright as in '*a*'; no red on back, its place being taken by pale yellowish-brown. Beneath throat, slatey grey sparsely flecked with white.

(*c*) ♀. Above and below, identical with '*a*' excepting the throat, which is white, handsomely vermiculated with dark blue and with a dark blue patch posteriorly.

Three Vituri females when brought in were brown but on being chloroformed turned red, with blue heads.

Measurements of Type.

Length of head and body	96 mm.	Breadth of head	18 mm.
Length of tail	168 "	Hind limb	58 "
Length of head	25 "	Longest (4th) toe	25 "

Measurements. The largest male (Bagilo type) measures 264 (96 + 168) mm.; the largest female (Amani) 274 (93 + 181) mm. Average total length of eighteen adult males is 245 mm.; average total length of twenty-one females is 212 mm. The smallest specimen, taken at Amani on 29. xi. 26., measures 76 (30 + 46) mm.

Breeding. As I ran round a rock, hoping to surprise some of these shy agamas, I suddenly came upon a red-backed female with her back arched in a most peculiar manner. Approaching her was a male (type in above colour description). She promptly disappeared on catching sight of me and I shot the male, having little doubt that I had broken in upon a courtship scene. Bagilo, 24. ix. 26.

The female '*a*' held 8 eggs containing traces of embryos; these measured 15 × 9 mm. In '*c*' were 6 round developing eggs measuring 8 mm. in diameter. No developing ova at all in '*b*.' 24. ix. 26.

Three females brought in at Vituri on 27. x. 26 held 8, 8, and 10 eggs respectively; two lots were much enlarged, nearly ready for laying; the other lot was only half developed.

Diet. The stomachs of all five Bagilo agamas were crammed with ants; in addition two individuals had each eaten a grasshopper. Many of the Amani lizards were examined and all seen had fed on ants.

Parasites. Red acarine parasites (Trombidid) insert themselves beneath the ventral scales, giving the latter an eruptive appearance; they were present on specimens from nearly all localities. Nematodes (*Physaloptera amaniensis* sp. n.) were taken from the stomach of an Amani agama. A grub-like creature was found in the intestines of a Bagilo lizard.

Habitat. At Bagilo these agamas frequent rocks of moderate size which are scattered about the native gardens, and waste lands thickly overgrown with grass and bushes. If disturbed when basking, they almost invariably run to the farther side of the rock and down among the matted vegetation at its base. This habitat is shared by *Mabuya varia* which seemed to occur in about the ratio of three skinks to one agama.

Two males from Nyange were shot a couple of miles from camp among the rocks fringing the stream in the valley bottom; one was apparently drinking at the water's edge when disturbed. The species is scarce at Nyange.

An adult male was shot at Tawa while basking, at a height of four feet from the ground, on the vertical trunk of a Javan silk-cotton tree. All the specimens obtained in the Usambaras, except one from Lutindi, were found on tree-trunks outside the rain-forest.

A female at Lutindi was found beneath a log where she had quite possibly retired to lay her eggs.

Agama colonorum usambarae sub. sp. n.

Plate **2**, fig. 1

14 (M. C. Z. 24129–39) Soni, near Lushoto, Usambara Mtns., 18. xi. 26 and 31. xii. 26.

Kokolwe in Kisumbara.

Type. No. 24129. Museum of Comparative Zoölogy. Adult ♂ taken on rocks at Soni, close to the Half-way House on the Mombo-Lushoto Road, Western Usambara Mountains, Tanganyika Territory. Collected by A. Loveridge, November 18th, 1926.

Paratypes. Nos. 24130 to 24139. Six males, six females and a young one all from the same locality. 31. xii. 26. Also three males, two females and three young from Mnazi, northern side of Usambara Mountains. (Field Museum of Natural History Nos. 12280–7.)

Affinities. These agamas have been compared with thirty-two West African *colonorum* from Senegal, Liberia, Cameroon, Gaboon and Congo, from all of which they consistently differ in the

(1) Much broader head of old Usambara males.

(2) More depressed body, though not so depressed as in *lionotus*.

(3) Median line of the back smoother, having less of a keel than in typical *colonorum*.

(4) Dorsal scales only very slightly mucronate, not terminating in such long spines as they do in *colonorum*.

(5) Crimson-lake colouring of the heads of males as against the brick-red of Liberian specimens as figured by Sir Harry Johnston in Liberia, Vol. II, coloured plate facing page 814. See also *Discussion* below.

Discussion. Schmidt [1] has pointed out that Lower Congo *colonorum* have a higher number of canthal and supraciliary scales than those from the West Coast. West Coast 6–8. Lower Congo 7–9. An examination of the largest series in the Museum of Comparative Zoölogy, viz., 11 Liberian, 14 Cameroon and 14 Usambara, results in an individual range for each of 6–9, with an individual average of 7; the Field Museum specimens range from 9 to 10, with an average slightly above 9, so that this character is of no assistance.

Schmidt adds that the average number of mid-body scale-rows also seem somewhat higher in Lower Congo *colonorum* than in forest specimens: 64 versus 70, with 68 in Sudanese specimens. It is to be noted that the highest number of scale-rows are on females on the West Coast, on males in Usambara, so the proportion of these in a series may result in a higher average. After arranging the Museum of Comparative Zoölogy material geographically from West to East, one gets the following result:

3 Senegal *colonorum*	range:	58–64	with	average	of	60.
11 Liberian	"	60–64	"	"	"	62.
14 Cameroon	"	72–84	"	"	"	75.
2 Gaboon	"	61–64	"	"	"	62.
1 Congo	"	65	"	"	"	65.
3 Blue Nile	"	72–84	"	"	"	76.
22 Usambara	"	70–80	"	"	"	75.

(The last line includes Field Museum material; without, it was 76.)

He also refers to Stejneger, whose eastern *colonorum* has fewer spines in the nuchal crest (10–11 versus 12–15), a point not borne out by Schmidt's Congo series of 134 examples:

> Average of 8 adult Liberian specimens is 12 (range 11–17).
> Average of 10 adult Cameroon specimens is 15 (range 8–25).
> Average of 10 adult Usambara specimens is 11 (range 10–13).
> Average of 8 Field Museum Usambara specimens is 13 (range 7–15);

which lends but slight support to Stejneger's suggestion.

[1] Schmidt, 1919, Bull. Am. Mus. Nat. Hist., **39**, Art. II, p. 473.

A single Angolan specimen has 22. This individual has dorsal scales much like the Usambara agamas and its ventral scales are smooth like those of our Congo specimen and the Usambara series. On the other hand Senegal, Liberian, Cameroon (young excepted) and Gaboon *colonorum* have faintly keeled ventrals, of which there is not the slightest trace in the Usambara series.

Three specimens collected by Dr. John C. Phillips at Rhino Camp agree with *colonorum* in not being depressed, but with *Usambara* specimens in having smooth belly scales and the keeling and spinosity of the dorsals.

It might be pointed out that the character of the relative length of the longest spines in the region of the ear as compared with the diameter of the tympanum is of little use as so much variation occurs; similarly the elongate scale on the middle of the snout is but little help. Seven of the Usambara specimens have 1, nine have 2, and two have 3 such elongated scales.

Description. Longest spines about ear are less than half the diameter of the tympanum in type but range from 1.5 to 3 mm. in length in the paratype series, while the diameter of the tympanum ranges from 3.5 to 6 mm. in the same series and is 4 mm. in the type. Mid-body scale-rows in type are 70 but range up to 80 in the nine paratype males, with an average of 76. (In the eight female paratypes the range is also 70 to 80, with an average of 74.) There are 12 femoral pores in the type but the whole series shows a range from 10 to 14, with an average of 12. Dorsal scale-rows decrease in size from vertebral line, where they are irregular in size, to the sides, where they change abruptly to very large, mucronate, but keelless ventrals that lose their spines and decrease in size towards the median line of the belly.

Coloration of Type ♂. Above, crimson-lake on head, slightly orange on nape; back, including fore and hind limbs, brilliant ultramarine except along the vertebral line, where it is pale bluish-white; some light spots on back (in some fully adult specimens these are lacking); basal portion of tail bright ultramarine, thereafter banded white and ultramarine, the latter darkening towards the tip, where the bands are almost brown. Below, bright crimson-lake on chin and throat, with four more or less ∧-shaped, dark-grey lines following the outline of the lower jaw (in old specimens these lines may be indistinct); breast, including under side of fore limbs to wrist and from gular fold to an imaginary straight line between the axilla, ultramarine; rest of under surface, including soles of fore feet but excluding base of tail, white (in one paratype the colouring of breast and belly is reversed, the former being white and the latter ultramarine; in adults the whole of the under surface, except for a median praeanal patch on the belly, is bright ultra-

marine; the praeanal region, soles of fore and hind feet, under side of thighs and tail in these individuals is buff); base of tail bluish.

Coloration of ♀. Above, pale coppery-brown on head and body, limbs and tail grey; pale-green spots edged with black on head and neck; well-defined transverse bars of sepia on back and tail, and spots of the same colour on limbs; a conspicuous band of brick-red, more or less edged with black, above fore limb and extending half an inch along the side; a similar but not quite such a long band on flank in front of hind limb. Below, throat creamy with three dusky bands following its outline and some rather indistinct spots or blotches in the centre; rest of under-surface, including limbs, pure white.

Measurements. Type ♂. Snout to vent 115 mm. Tail 193 mm.

The nine paratype males range from 110 to 135 mm. in length from snout to vent and from 175 to 220 mm. in length of uninjured tails. The greatest total length from snout to tip of tail is 350 (130 + 220) mm.

The eight paratype females range from 79 to 105 mm. in length from snout to vent and from 135 to 175 mm. in length of uninjured tails. The greatest total length from snout to tip of tail is 280 (105 + 175) mm.

A young agama taken on 21. xii. 36 measures 91 (36 + 55) mm.

Breeding. Four of the six (M. C. Z.) females held large, well-developed eggs.

Size of ♀ (head to vent)	105 mm.	No. of eggs	6,	measuring	19 × 11 mm.
"	104	"	7	"	20 × 13
"	94	"	7	"	22 × 13
"	92	"	6	"	20 × 13

They were all taken on 31. xii. 26, rather indicating a definite breeding season.

Diet. Unfortunately the native collector removed the stomachs of those he procured. The first pair obtained by myself held a great many ants' heads, several beetle elytra and a single grasshopper. I was unable to distinguish any vegetable matter.

[Agama atricollis Smith]

Agama atricollis Smith, 1849, 'Illus. Zoöl. S. Afr.,' **3**, Appendix, p. 14.

Monsieur F. Angel in a recent paper (1925, 'Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale [1911–1912],' p. 13), records seven agamas from Kisumu, Kenya Colony, as *A. cyanogaster* Rüppell, a species usually regarded as ranging through Arabia and Abyssinia. The junior author, having previously collected *A. atricollis* at Kisumu, was anxious to examine these specimens, which was possible through the courtesy of Monsieur Angel.

Boulenger's[1] key character of

Nostril pierced on the canthus rostralis ..... *atricollis*
Nostril pierced below the canthus rostralis ..... *cyanogaster*

[1] Boulenger, 1885, 'Cat. Liz. Brit. Mus.,' p. 337.

breaks down in practice and it was this that probably led Mocquard, who made the identifications, astray. A juvenile example of *cyanogaster* from Harar, Abyssinia, in the Museum of Comparative Zoölogy (No. 8064), has the nostril placed in precisely the same position as all our series of *atricollis* from various East African localities.

Some *atricollis* specimens collected at Lake Tanganyika by Mr. Nutt (B. M. No. 76.5.14.10–13) were examined by the junior author when at the British Museum in February. These have the nostril pierced below the canthus, i.e., in the same scale and precisely the same position as in typical Abyssinian *cyanogaster*. The nostril in *atricollis* is round, while in adult *cyanogaster* it is more often pear-shaped, the apex pointing backwards or upwards.

The range of *cyanogaster* as given by Angel (undoubtedly based on Mocquard's identifications, the alleged Mozambique example being in the Paris Museum), as extending to Kenya Colony and Mozambique, can hardly be correct.

VARANIDAE

Varanus niloticus (Linnaeus)

Lacerta nilotica Linnaeus, 1766, Syst. Nat., ed. 12, p. 369.

1 (M. C. Z. 24140) Mogogoni Swamp near Dar es Salaam, 9. xi. 26.
1 (M. C. Z. 24141) Sigi near Amani, Usambara Mtns., 29. xi. 26.

Nhengi (Kikami); *kengi* (Kiswahili); *mbulu* (Kisumbara).

Measurements. The female from Sigi measured 4 feet $8\frac{3}{4}$ inches (600–850 mm.) in length.

Breeding. She held forty-three eggs, each measuring 50 × 35 mm. (approximately 2 × $1\frac{1}{2}$ inches).

Diet. In her stomach were two large scarabs and a crab; the half-grown male had also eaten a crab.

Parasites. The male was infected with numerous nematodes (*Tanqua tiara*) and a cestode (*Duthiersia fimbriata*); the female had no visible internal parasites but carried many ticks (*Aponomma exornatum*).

Distribution. This monitor lizard occurs in the Uluguru Mountains as high as 6,000 feet (Bagilo), but is not common there, as none were seen anywhere; they are plentiful at Morogoro at the foot of the range.

LACERTIDAE

Eremias spekii spekii Günther

Eremias spekii Günther, 1872, Ann. Mag. Nat. Hist. (4) **9**, p. 381.

1 (M. C. Z. 22994) Mainland opposite Kilindini, Kenya Colony, 3. v. 26.
1 (M. C. Z. 24142) Tumvi, foot of Uluguru Mtns., 1. xi. 26.
1 (M. C. Z. 24143) Tanga, 15. xi. 26.
1 (M. C. Z. 24144) Foot of Mt. Lutindi, Usambara Mtns., 13. xii. 26.

Distribution. Apparently it does not occur in the mountains though abundant at the foot of both ranges. The Tumvi specimen was found fast asleep at 8 A.M. on the sunny Vituri–Morogoro Road.

Holaspis guentheri Gray

Holaspis guentheri Gray, 1863, Proc. Zoöl. Soc. London, p. 153, Pl. XX, fig. 1.

1 (M. C. Z. 24145) Amani, Usambara Mtns., 20. xi. 26.
1 (M. C. Z. 24146) Derema, Usambara Mtns., 29. xi. 26.

Chungula in Kisumbara.

Distribution. These specimens are topotypes of Werner's *H. g. laevis* which cannot be considered valid. The distribution of this forest form is remarkable, as it occurs at Bukoba, Zomba, Nyasaland and Angola. I think it very probable that it will some day be found in the Uluguru Mountains.

Habitat. It is extremely rare at Amani and impossible to obtain except by shooting. I shot one on a eucalyptus (introduced) tree near the top of Mt. Bomoli, and two others were seen on eucalyptus trees. The custodian of Amani informed me he had seen them only on eucalyptus trees but I found the Derema specimen sunning itself near the base of a giant tree on the forest-edge. Their depressed outline renders them inconspicuous and I quite agree with Schmidt that the curious tail processes are an aid to climbing. They may be compared with the caudal scales of the flying squirrel (*Anomalurus orientalis*) which haunts the same forests.

SCINCIDAE

Mabuya comorensis (Peters)

Euprepes comorensis Peters, 1854, Monatsber. Akad. Wiss. Berlin, p. 619.
Mabuia comorensis var. *infralineata* Boettger, 1913, in Voeltzkow, 'Reise in Ostafrica,' **3**, p. 239. (Europa Id., Mozambique.)

2 (M. C. Z. 24147–8) Bagilo, Uluguru Mtns., 20–23. ix. 26.
1 (M. C. Z. 24149) Mkarazi, Uluguru Mtns., 22. x. 26.
1 (M. C. Z. 24150) Dar es Salaam, 4. xi. 26.
25 (M. C. Z. 24151–70) Amani, Usambara Mtns., xi. 26.
3 (M. C. Z. 24171–3) Bumbuli, Usambara Mtns., 14. xii. 26.

Ghondo in Kisumbara.

Variation. Scale-rows 34–38; these were carefully checked and recounted. The supranasals may, or may not, be in contact behind the rostral, in exactly equal proportions; the anterior loreal is usually in contact with the first labial though it very often is not; the praefrontals also may, or may not, be in contact. The species has a pretty wide range of variation, as will be seen from the description in the 'Catalogue of Lizards in the British Museum.'

Boettger, when describing his colour variant *infralineata*, states that he found no structural difference between it and typical *comorensis*. Its claim to recognition lies in a series of fine black lines (formed by a speck on each scale) from snout to, and on, the base of the tail. In our series such lines are absent or present only on throat and tail. It is, perhaps, a matter of personal opinion whether insular colour variants should receive recognition.

Coloration. Bagilo ♀. Above, nut-brown sparingly speckled with cream, sides darker brown with indications of a black band separating sides from back, sides also freckled with cream; rim around eye light yellow; throat greyish-white with brown speckling sharply divided from the under side of neck and body to anus, all of which is clear bright yellow.

Mkarazi ♂. Almost identical with that of the brilliantly coloured Frere Town specimen described in Proc. Zoöl. Soc. Lond., 1923, p. 956, but in this present specimen the cream-coloured subocular stripe is broken up into spots and there is no blue on the throat, which is shiny white. Testes large.

Measurements. Largest male measured 237 (91 + 146) mm., but one with a reproduced tail had a head and body length of 98 mm.; this patriarchal individual measured 20 mm. across its head and 25 mm. across mid-body; with age the head develops out of proportion to the body. The largest female measured 258 (98 + 160) mm. but was much more slender than the male. Both were from Amani.

Breeding. Eleven eggs measuring 14 × 8 mm. in Bagilo ♀ taken on 20. ix. 26.; undeveloped in another female killed three days later at same place. Nine, eleven and twelve eggs in three females collected at Amani on 24. xi. 26.

Diet. Large cricket in Bagilo skink. Large locust and a large praying mantis and a mollusk in the Mkarazi specimen. Cockroach in Dar es Salaam reptile. Five Amani skinks examined had grasshoppers and beetles in their stomachs; in addition one had a caterpillar.

Parasites. Red acarine parasites in ears of Bagilo skink. Nematode in stomach of an Amani specimen taken 25. xi. 26.

Enemies. One recovered from the stomach of a snake (*Lycophidion capense*) at Amani.

Distribution. The Comoro Id. Skink is apparently no exception to the general rule that most scarce creatures are generally common in some locality. Its mainland records have been very few, for only single specimens are usually met with, but at Amani it is a tolerably common reptile.

Habitat. One Bagilo specimen was shot while basking on the edge of a fissure in the face of a cliff; it had for company many *Hemidactylus persimilis.* The Mkarazi male was basking on a tree stump in the dry forest near the Mvua River. The Dar es Salaam female was beneath a pile of coconut husks close to the incinerator on the sea-front near the golf course. At Muheza one was seen on the trunk of a rubber-tree in a plantation. The rain-forest is apparently the ideal habitat, for at Amani it was common in the forest between 8 and 12 A.M. These skinks emerge from the fringe of swept-up leaves which border each path, to bask in the sunshine, but so quick are they in their movements that few but naturalists would see them; a rustle of the leaves is usually the only sign of their presence. At other times, and indeed at all hours of the day, they may be apprehended beneath, or within, the fallen tree-trunks that are scattered about the arboretum. Fairly often they are seen on the trunks of growing trees but not so frequently as on the banks flanking the paths. A pair were seen on tree-trunks at Mt. Lutindi.

Mabuya maculilabris (Gray)

Euprepis maculilabris Gray, 1845, Cat. Lizards, p. 114. (West Africa.)
Mabuia boulengeri Sternfeld, 1911, Sitz. Ges. Naturf., Berlin, p. 248. (Makonde Highlands, S. E. Tang. Terr.)
Mabuia maculilabris major Sternfeld, 1912, Wiss. Ergeb. Deutsch Zent. Afrika Exp. 1907–08, **4**, 2, p. 232. (Central African Lake Region.)
Mabuia maculilabris kividjwiensis Sternfeld, 1912, l.c. p. 233. (Kwidjwi Is., Lake Kivu.)
Mabuia maculilabris wauensis Sternfeld, 1912, l.c. p. 233. (Wau Is., Lake Kivu.)

Mabuia maculilabris schubotzi Sternfeld, 1912, l.c. p. 233. Pl. VI, fig. 3. (Fort Beni and Kassenje, Belgian Congo.)
Mabuia maculilabris graueri Sternfeld, 1912, l.c. p. 234. Pl. VI, fig. 4. (Congo belt.)
Mabuia maculilabris rohrbecki Sternfeld, 1912, l.c., p. 234. (Nguru Mtns., and Langenberg in East Central and South Western, T. T.)
Mabuia albotaeniata Boettger, 1913, in Voeltzkow, "Reise in Ostafrika," **3**, p, 350. (Pemba Id.)

1 (M. C. Z. 24174) Vituri, Uluguru Mtns., 30. x. 26.

Material. In addition to the above we have used for the purposes of this investigation forty-two examples from fifteen localities ranging from São Thomé Id. off the West Coast to Pemba Id. off the East Coast, including a series from the Central African Lake region just brought back by Dr. Joseph Bequaert.

Variation. Sehmidt [1] has already referred *M. m. major* and *M. m. bergeri* Sternfeld (Dufile, Sudan) to the synonymy of *M. maculilabris*, and a careful perusal of Sternfeld's deseriptions, which are brief and based almost entirely on colour variations, forces us to the eonclusion that in the present state of our knowledge they are not entitled to recognition.

M. boulengeri is stated by its describer to be 'very near *maculilabris*' from which it differs principally in the high number of keels on the scales (7–9 with here and there 10 or 11), the smaller number of supraciliaries (4, the type of *maculilabris* had 5), the greater body length (toes of the adpressed hind limb scarcely touching fingers of the fore limb), and the colouring.

Boettger has proposed to differentiate Pemba Id. specimens on the basis of 4 supraciliaries and the presence of a distinct light lateral line. The lateral line can be matched by a specimen taken on board ship near Lulonga, Belgian Congo (M.C.Z. No. 24812); except for the Pemba examples this is the only one of our long series in which it occurs.

Below we have placed in tabular form particulars of our comparative material. 'West Africa' was given by Gray as the type loeality of *maculilabris*, but it will be observed that a São Thomé lizard had from 7 to 11 keels, as also one Cameroon lizard; A Cameroon skink had 4 supraciliaries, Schmidt has recorded from 3 to 6 in his Congo series of 143 specimens, there are two with 3 or 4 among our Congo specimens, another from S. E. Ruwenzori has 4. It is true that the majority of Tanganyika Territory lizards have the lower number, three of the four skinks have 4, and one of the two Pemba Id. skinks has 4, the other two have 5. The longer body of Tanganyika skinks is eertainly noticeable when compared with Central African skinks, but many Cameroon reptiles have the digits only just meeting. In coloration a Mkindo River, T. T., reptile agrees very elosely with the type of *boulengeri* but has 5 supraciliaries and only 7 carinations on its seales,

[1] Sehmidt, 1919, Bull. Am. Mus. Nat. Hist., **39**, Art. II, pp. 525–531.

while the toes of the adpressed hind limb reach to the wrist of the back-pressed fore limb. It seems therefore that the single specimen of *boulengeri* on which the description was based had a combination of characters which do not usually occur in one individual, but are common characters of *maculilabris*.

It appears that while *M. maculilabris* is a common skink in West Africa — we have recently received forty-one examples from one locality in the Cameroons — it is a scarce reptile in East Africa, for the junior author secured only fourteen in eight years. There are marked family likenesses in specimens coming from any given locality, both in colour (thus, while those from the Central Lake region (*major*) are strongly spotted with light and dark, which is also the case with the São Thomé reptile, East African skinks are bronze with very few spots but can be matched by Cameroon skinks) and in other characters (there is a noticeable decrease in mid-body scale-rows, and possibly supraciliaries also, as one proceeds from West to East), so that it appears as if *maculilabris* is undergoing evolutionary differentiation, but these variations have not progressed far enough, or become sufficiently standardized, to merit racial recognition.

LOCALITIES ARRANGED FROM EAST TO WEST AFRICA

Locality	Number of skinks	Greatest head and body lengths in mm.	Longest tail in mm.	Mid-body scale-rows	No. of supra-ciliaries	Keels on scales
Pemba Id.	2	62	123	30	4–5	5
Tawa, Tanganyika Territory	1	76	115	30	4	7
Mkindo River, Tanganyika Terr.	1	76	184	30	5	7
Kipera, Tanganyika Territory	1	82	168	30	4	7
Kilosa, Tanganyika Territory	1	85	203	30	4	7
Lulonga, Belgian Congo	1	73	112	30	7	3–4
Rutshuru, Belgian Congo	5	82	123	32	5	5–8
Mt. Mokia, s.e. Ruwenzori	2	85	174	30–32	4–6	7
Mutea, White Nile	2	84	180	32–34	5	7
Bumba, Belgian Congo	6	85	153	32–34	4–6	5–7
Metet, Cameroon	4	85	103	34–36	5–6	5–7
Lolodorf, Cameroon	8	88	135	33–36	4–6	5–11
Sakbayeme, Cameroon	8	83	156	34–36	5	5–7
São Thomé Id.	1	84	95	32	5	7–11

Mabuya megalura (Peters)

Euprepris (*Mabuia*) *megalurus* Peters, 1878, Monatsber. Akad. Wiss. Berlin, p. 204, Pl. II, fig. 4.

1 (M. C. Z. 24175) Dar es Salaam, 4. xi. 26.
1 (M. C. Z. 24176) Amani, Usambara Mtns., 30. xi. 26.

Coloration. The Amani female has nine distinct longitudinal lines from throat to vent, while the Dar es Salaam specimen is normal below, i.e., iridescent white.

Measurements. The male is unusually large, 223 (56 + 167) mm.

Mabuya varia varia (Peters)

Euprepes (*Euprepis*) *varius* Peters, 1867, Monatsber. Akad. Wiss. Berlin, p. 20.
Mabuia varia var. *longiloba* Methuen & Hewitt, 1913, Ann. Transvaal Mus., **4**, 1914, p. 142. (Namaqualand.)

4 (M. C. Z. 24181) Bagilo, Uluguru Mtns., 23. ix. 26.
6 (M. C. Z. 24182) Nyange, Uluguru Mtns., 8. x. 26.
1 (M. C. Z. 24183) Misalae, Usambara Mtns., 7. xii. 26.
3 (M. C. Z. 24184) Bumbuli, Usambara Mtns., 14. xii. 26.
2 (M. C. Z. 24185) Kwai, Usambara Mtns., 24. xii. 26.

Kigologondwa in Kikami.

Variation. All agree in having the anterior loreal in contact with the first labial; four have the frontonasal widely separated from the frontal (2 Bagilo, 1 Nyange, 1 Misalae); in all but the Misalae skink (where they are equal) the frontal is a little shorter than the frontoparietals and interparietal together; in all but a Nyange specimen the frontal is in contact with the second and third supraoculars (in the Nyange specimen on one side only it is in contact with the first, second, and third); frontoparietals distinct; parietals more or less in contact behind the interparietal except in two Nyange skinks. The subocular is usually 'feebly but distinctly narrowed inferiorly'; the condition of 'much narrowed inferiorly' is nicely demonstrated in this series by several which have, by division of the subocular, given rise to an extra labial at its expense. The variation in the length of the hind limbs is well shown, for some adpressed hind limbs barely meet the digits of the fore limbs while in others they nearly reach the elbows. All have tricarinate dorsal scales. One has a reproduced bifid tail.

We are fortunate in having received from Mr. Hewitt a cotype of the form *longiloba* characterized by unusually long and sharp ear lobules. Whereas most East African examples are typically short-lobed, the Namaqualand paratype can be matched in the length of its ear lobules by individuals selected from large series with mainly short or medium-sized lobules, for example, M.C.Z. No. 18668 from Mtali's, Mkalama subdistrict of Tanganyika Territory.

Coloration. In the largest male taken, a Bagilo skink, the black and white dorsal markings are sharply contrasted; while below, from just in front of the hind limbs to the tip of the tail, is suffused with salmon. An unusually handsome skink with enlarged testes.

Measurements. This male measured 172 (67 + 105) mm.; the largest female, also from Bagilo, measured 191 (71 + 120) mm.

Breeding. At Bagilo a ♀ with 5 eggs showing traces of embryos was taken on 11. ix. 26, another with 10 eggs on the 14th, and a third with 9 eggs on the 23rd; all the eggs were in the same stage of development. At Nyange during the first

fortnight of the following month all the females appeared to be pregnant; a young skink was taken on 11. x. 26 which measured 56 mm. over all. Many young were seen at Vituri on 25. x. 26, Misalae on 7. xii. 26, Phillipshof on 23. xii. 26 and Kwai on 24. xii. 26. A young one taken at the last locality on that date measured 60 mm.

Diet. A Bagilo skink disgorged a stick insect and a red grasshopper on being caught; the following day a second lizard disgorged a grasshopper in the same way. In the middle of the road at Bumbuli was a skink so preoccupied with its meal that it allowed me to walk up and leisurely plant my snake-stick upon its back.

Habitat. On rocks at Vituri and Bomoli. At Mogogoni it was fairly frequently seen upon the trunks of the coconut palms, yet at Dar es Salaam, which is only a few miles away, I have never seen *varia* on a tree, as there are few trunks unoccupied by *M. striata*. At Misalae quite a number were seen on the rocks beside the path at 2 P.M., in hot sunshine; they were so tame that they allowed one to approach within a yard before retiring.

[Mabuya irregularis Lönnberg]

Mabuia (*striata* ? var) *irregularis* sp. n.? Lönnberg, 1922, Ark. Zoöl. **14**, p. 4.
Mabuia (*Mabuiopsis*) *jeanneli* Angel, 1923, Bull. Mus. Hist. Nat., Paris, p. 490.; 1925, 'Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912),' Paris, pp. 21–23, Pl. I, fig. iii.

Relationship. It is a matter of personal opinion if the subgenus *Mabuiopsis* proposed by Mons. Angel is to be recognized. In that the whole family of skinks show great variability in the arrangement and division of their head shields, we rather doubt if the proposed division is a natural one; while the group of scales on the head of *M. irregularis* is certainly most unusual it has so many other characters in common with *M. striata* and *M. v. varia* that it seems inadvisable to separate it from those species by placing it in a subgenus by itself. See figures of *M. varia* in Tornier (1900), p. 597, and *M. acutilabris* in Schmidt, 1919, Bull. Am. Mus. Nat. Hist., **39**, Art. II, p. 552.

Distribution. To those interested in the mountain fauna of East Africa, Mons. Angel's new record of two specimens from Kinangop in the Aberdare Range at 10,204 ft. will come as a welcome addition to our knowledge. It was described from Soy near Mt. Elgon in 1921, then recorded from Mt. Kenia between 10,000 and 11,600 feet in 1923, and Mons. Angel records the fifth and sixth known specimens in 1925.

Variation. The junior author on examining Mons. Angel's specimens finds them in agreement with those from Mt. Kenia in the six points cited in Proc.

Zoöl. Soc., 1923, p. 952, except that in the larger example the anterior loreal is in contact with the first labial on the right side but scarcely so on the left; it also disagrees with them but agrees with Lönnberg's type in that (i) the parietals are not in contact behind the interparietal; (ii) it has a single pair of enlarged nuchals.

Mabuya striata (Peters)

Tropidolepisma striatum Peters, 1844, Monatsber. Akad. Wiss. Berlin, p. 36.

1 (M. C. Z. 24177) Bagilo, Uluguru Mtns., 24. ix. 26.
1 (M. C. Z. 24178) Dar es Salaam, 4. xi. 26.
2 (M. C. Z. 24179) Amani, Usambara Mtns., 19. xi. 26.
Also seen at Nyange, Mkangazi, Vituri, Tanga and Muheza.

Kiguruguja (Kikami Kiluguru, Kikujao); *mjusi islam* (Kiswahili); *ghondo ya nyumba* (Kisumbara). Though primarily intended for the Striped Skink, these names are sometimes applied to *M. v. varia*, most natives not distinguishing between them. The Kiswahili name, literally 'lizard of peace,' is applied 'because it lives with people without making any trouble' (this is in reference to its dwelling in the thatch of so many huts).

Breeding. Numerous ova within the Bagilo skink held embryos on 24. ix. 26; this was also the case with a skink from Nyange found in the stomach of a snake 2. x. 26.

Enemies. A large ♀ recovered from a *Lycophidion capense* at Nyange; another from the stomach of a kestrel (*Cerchneis tinnunculus carlo*) at Mkangazi.

Habitat. One was seen running up a cliff-face at Vituri. At Dar es Salaam I disturbed a Striped Skink on the steep bank of a dyke bordering a stream four feet in width. The lizard made for the field but I headed it off; it rushed back to the bank, down which it tumbled into the water, apparently swam across to the other side under water, put out its head and then disappeared entirely. This species seems to be on the increase in Dar es Salaam, scarcely a tree in some avenues being without one. At Amani they were common on the trees bordering the avenues but were never met with in the forest where *M. comorensis* occurred.

Riopa sundevallii (Smith)

Eumices (*Riopa*) *sunderallii* Smith, 1849, 'Illus. Zoöl. S. Afr.' **3**, Appendix, p. 11.

1 (M. C. Z. 24199) Dar es Salaam, 4. xi. 26.
1 (M. C. Z. 24200) between Sigi and Amani, 25. xi. 26.

Vutavuta in Kikami; *nyoka a ghondo* in Kisumbara.

Distribution. Sundevall's Skink has not been recorded from Amani and it is doubtful whether it occurs there; the specimen referred to above was taken under a log about 200 feet above Sigi; doubtless with the deforestation of the ravines, which are being planted with bananas, this skink will spread up to Amani in time. In the highlands of Kenya it is found at 6,000 feet, as well as at the coast.

Siaphos kilimensis (Stejneger)

Lygosoma kilimensis Stejneger, 1891, Proc. U. S. Nat. Mus., **14**, p. 405.

5 (M. C. Z. 24186–90) Nyange, Uluguru Mtns., 7. ix. 26.
4 (M. C. Z. 24191–94) Vituri, Uluguru Mtns., 9, 25, 28, x. 26.
1 (M. C. Z. 24195) Kizerui, Usambara Mtns., 8. xii. 26.
2 (M. C. Z. 24196–7) Mt. Lutindi, Usambara Mtns., 10. xii. 26.
1 (M. C. Z. 24198) Bumbuli, Usambara Mtns., 14. xii. 26.

Variation. These thirteen specimens agree in minutest detail with the description of the type from Kilimanjaro except that the frontal does not equal the frontoparietals in length but the frontoparietals plus the interparietal; the frontal can hardly be called short, and perhaps the ear-opening is not always 'much larger' than the nostril; there are sometimes 8 supraciliaries.

Coloration. A breeding male taken at Nyange exhibits the following fugitive colours. Below, throat to vent bright yellow, subcaudal scales with a rufous tinge. Otherwise the colouring is as described by Stejneger.

Measurements. The largest male measures 198 (73 + 125) mm.; the largest female 178 (67 + 111) mm. but another with reproduced tail is 77 mm. in length from snout to vent. All three from Nyange.

Breeding. At Nyange the male, whose coloration is described above, had enlarged testes. The female held four white eggs measuring 11 × 6 mm.

Diet. The contents of seven stomachs examined were as follows: (i) Cricket and spider. (ii) Spider. (iii) Spider. (iv) Large grasshopper and what was apparently a hairy beetle larva. (v) Three large hairless caterpillars. (vi) Cockroach and woodlouse. (vii) Nil.

Enemies. Was first found in the stomach of *Lycophidion meleagris* at Bagilo, 20. ix. 26.

Distribution. First discovered on Kilimanjaro, then Mt. Kenia. Lönnberg has recorded it from Kibonoto, and Tornier from the rain-forest of 'Kagera und Kongo' (Tornier, 1900). It is here recorded from the Uluguru Mtns. for the first time.

Habitat. The Bumbuli specimen was taken crossing a leaf-strewn path in a banana plantation; all the rest were taken beneath logs in, or on the very edge of, damp rain-forest.

Ablepharus wahlbergii (Smith)

Cryptoblepharus wahlbergii Smith, 1849, 'Illus. Zoöl. S. Apr.' **3**, Appendix, p. 10.
Ablepharus massaiensis Angel, 1924, Bull. Mus. Hist. Nat., Paris, p. 52.

4 (M. C. Z. 24201) Dar es Salaam, 4. xi. 26.
1 (M. C. Z. 24202) Bagamoyo, 11. xi. 26.

Variation. Angel has described from Nairobi under the name of *A. massaiensis* a skink which differs from *A. wahlbergii* only in having 26 instead of 24 scale-rows and 2 supraoculars instead of 3. To check his conclusions we selected for examination two Nairobi specimens (M. C. Z. 18691), which were found to have 28 and 26 scale-rows respectively; also a series of fifty *wahlbergii* collected in an area of one hundred square yards at Lumbo, Mozambique, the first two specimens having 24 scale-rows, the third 26. As for the supraoculars, both Nairobi skinks have the normal 3, as have all specimens in the Lumbo series. It may be supposed therefore that Angel's *massaiensis* is abnormal in this respect.

Habitat. The Dar es Salaam skinks were taken among dried leaves beneath a mango tree near the golf course.

Scelotes eggeli Tornier

Plate **4**, fig. 5

Scelotes eggeli Tornier, 1902, Zoöl. Anz. p. 700.

21 (M. C. Z. 24213–24223) Phillipshof and Kwai, Usambara Mtns., xii. 26.

Nyoka a ghondo in Kisumbara.

Relation between Scelotes and Sepsina. Hewitt [1] has already given very excellent reasons for uniting Herpetosaura (Syn. Herpetoseps) with Scelotes, and more recently [2] has discussed the difficulties of differentiating the genus Sepsina from Scelotes and points out that the character of the palatine bones separated on the median line of the palate in Sepsina (meeting in Scelotes) breaks down in the genus Scelotes; an examination of the twelve species of that genus in the collection of the Museum of Comparative Zoölogy corroborates this view; in several of them the point of separation occurs about the median line so that the decision is quite an arbitrary one; the same applies to half-a-dozen species usually accredited to the genus Sepsina, which are also represented in the Museum of Comparative Zoölogy.

A second point in which the genera are supposed to differ is the absence of the nasal in Sepsina, its disappearance resulting in the nostril being between four shields — a condition found in at least one species of undoubted Scelotes affinities (*S. brevipes*).

Hewitt suggests that 'A more striking point of difference between the two genera is in the size of the interparietal scale, small in Sepsina but large and broader even than the frontal in Scelotes. Yet, *Sepsina grammica* Cope is said to have the interparietal large and nearly as wide as the frontal.'

[1] Hewitt, 1921, Ann. of Durban Museum, p. 3.
[2] Hewitt, 1927, Records of the Albany Museum, p. 404.

We have examined Cope's type (M. C. Z. No. 5787) and find that the interparietal is as small as in the other members of the genus. *Sepsina weberi* Roux from the South West Protectorate, however, has an interparietal much broader than the frontal, and its nostril is placed like those of the species of the genus Scelotes rather than those generally accredited to Sepsina.

Tornier evidently referred *eggeli* to Scelotes on the grounds of the palatine bones meeting on the median line of the palate. He makes no mention of the rudimentary nasal ring which is almost, if not entirely, indistinguishable in some of the present series. On the basis of the width of its interparietal scale, however, *S. eggeli* should be referred to Sepsina; but this would create an anomaly, for its very near ally in the Uluguru Mtns. is an undoubted Scelotes, therefore we find ourselves unable to maintain Sepsina as a distinct genus. From external characters it appears probable that these two genera should be united and the characters referred to should be employed to define subgeneric groups.

S. eggeli was based on two specimens from Kwai (where some of the present series were also obtained); Phillipshof is only about three miles from Kwai. This series adds considerably to our knowledge of the species and it seems advisable to redescribe it from the figured female (M. C. Z. No. 24213) and this series, incorporating Tornier's description so as to state clearly the range of variation.

Description. Snout moderate, about twice the length of the eye; rostral twice as broad as deep, with slightly lunulate upper edge; seven to nine upper labials, only 5th enters eye, 5th or 6th the largest; nostril pierced in the upper posterior part of the rostral, apparently separated from the postnasal by a narrow rim (rudiment of nasal), bounded above by the supranasal and below by the first labial; a large loreal, deeper than broad, broadly in contact with the frontonasal, which is broader than long; two praeoculars, a large upper and a small lower, the latter wedged between the third and fourth upper labials; frontonasal separated from the rostral by the supranasals which are in contact; frontal as long as its posterior breadth, longer than the snout, its posterior border slightly concave; the first supraocular pentrates into the frontal, four supraoculars; six or seven (five) supraciliaries; interparietal broader than long; parietals in contact behind interparietal; two pairs of enlarged nuchals; scales on lower eyelid plainly visible; ear opening distinct; 22 to 26 mid-body scale-rows; limbs pentadactyle, very short, the adpressed fore limb covering only three-quarters of the distance to the ear, shorter than the distance between ear and tip of snout; hind limb equals the distance between ear and tip of snout. The thick tail joins the elongated body with very slight diminution in girth.

Coloration of figured ♀. Above, iridescent plumbeous, each scale with a lighter spot. Below, creamy-yellow on chin and throat, sharply divided from the rest of the under surface, which is bright salmon-pink; and while each scale on the throat has a large black basal spot, these are wanting down the centre of the body from fore to hind limbs though present on flanks and tail.

Considerable variation occurs but most specimens differ from *S. ulugurensis* in the heavy spotting of their under surface; in a few like the figured ♂ these are almost confined to the sides and thus approach the immaculate appearance of *S. ulugurensis*. Some of the variations are as follows:

(*a*) ♀, 93 + 57 regenerated. Below, except on chin and throat, the centre of each scale is greenish-yellow and each has a larger or smaller dusky spot at its base; this colouring obtains only for a little more than the basal half of the tail, the regenerated portion being uniformly plumbeous both above and below, though somewhat lighter below than on the corresponding upper surface.

(*b*) ♂, 96 + 102 mm. and ♀, 83 + 103 mm. Creamy-yellow over whole of under surface except the end of the tail, which is white; each scale has a basal spot in these specimens.

(*c*) ♀, 82 + 103 mm. Throat white, fore limbs to anus pale orange, tail bright salmon-pink; each scale with a basal spot.

(*d*) ♂, 72 + 86 mm. Uniformly opaque white on whole of lower surface except for a basal spot on each scale. It will thus be seen that the common salmon colouring of the tail is not an infallible guide to sexing males though so often present in that sex, nor is it adopted solely by breeding males, as it is present on some immature skinks.

(*e*) Embryos. 32 + 33 mm. Above, uniformly plumbeous; light grey or almost white beneath. Still younger embryos are, of course, unpigmented.

Measurements. The largest female measures 205 (101 + 104) mm. The largest male measures 206 (90 + 116) mm., but No. 24220, which has a regenerated tail, measures 102 mm. in length from snout to vent. The youngest independent skink taken measures 35 mm. from snout to vent. For measurements of embryos see below.

Breeding. The figured ♀, taken on 21. xii. 26, held three embryos measuring 65 (32 + 33) mm.; other females taken at the same time held less-developed embryos.

Diet. Contents of seven stomachs examined: (i) Beetle. (ii) Beetle, beetle larva, cockroach. (iii) Cockroach. (iv) Cockroach. (v) Grub. (vi) Spider. (vii) Spider.

Parasites. Most intestines contain very minute nematodes, invisible to the naked eye; in one stomach was a larger species.

Distribution. So far known only from Phillipshof and Kwai in the Western Usambaras.

Habitat. All save one were taken beneath logs on recently cleared forest or pasture land. While seated on the side of the road, which was cut through the forest, I heard a 'plop' behind me and, looking round, saw one of these skinks, which had fallen over a five-foot bank at the other side of the road and was wriggling about among the dead leaves, none the worse for its fall.

Scelotes uluguruensis sp. n.

Plate **4**, fig. 6

5 (M. C. Z. 24204–8) Bagilo, Uluguru Mtns., 25–28. ix. 26.
8 (M. C. Z. 24209–12) Vituri, Uluguru Mtns., 27–30. x. 26.

Vutavuta in Kikami.

Type. No. 24204. Museum of Comparative Zoölogy. An adult male taken beneath a log at edge of the rain-forest at Bagilo, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, September 25th, 1926.

Paratypes. Nos. 24205 to 24212 and four duplicates.

Diagnosis. Together with *Scelotes eggeli* this new skink is readily distinguishable from the only other members of the genus occurring in East Africa by the presence of five instead of four digits on both fore and hind limbs. The interparietal in this new species being in contact with the third and fourth supraoculars at once distinguishes it from *Scelotes eggeli*. Its nearest relatives of the genus Scelotes (and Sepsina) appear to occur on Comoro Id. and Madagascar.

Description. Rostral very broad with lunulate upper edge, seven or eight upper labials, fifth, which is largest, below eye (occasionally 4th and 5th below eye); nostril pierced between rostral, supranasal, nasal and first labial; a large postnasal broadly in contact with the frontonasal; two praeoculars present, a large upper and a very small lower; frontonasal separated from the rostral by the supranasals, which are in contact; four supraoculars, the first three in contact with the frontal, the third and fourth in contact with the interparietal; six supraciliaries, of which the first is in contact with the postnasal and the frontonasal; scales on lower eyelid plainly visible; a pair of parietals in contact behind the interparietal; two (sometimes a third indicated) pairs of enlarged nuchals; ear-opening distinct; 24 mid-body scale-rows; limbs pentadactyle.

Coloration of Type ♂ in life. Above, snout to end of body transparent reddish-brown, plates on head edged with darker, a black spot on the apex of each scale;

these spots coalesce on fore arm so that the latter is largely black; the black spots on the hind limbs are so large that they give the latter the appearance of being black; tail deep plumbeous black; first four upper labials black, rest dusky; sides of body and anterior aspects of limbs creamy-white, each with a black spot.

Below, translucent white on throat, body and limbs; the blood vessels of the throat, and internal organs of the body, may be seen through the scales, to which they impart red and orange tints; the under side of the tail is opaque white with double rows of dusky spots laterally.

The colouring of the female paratypes is identical with that of the male; some unsexed specimens show pinkish beneath the tail.

Measurements. Type ♂. Snout to vent 75 mm. Tail 96 mm. Largest Bagilo ♀. Snout to vent 88 mm. Tail 70 mm. (Perhaps regenerated.)

Breeding. The Bagilo female, taken on 25. ix. 26, held four ova measuring 10 × 7 mm.; a Vituri female, collected 27. ix. 26, held four measuring 11 × 8 mm. These latter showed a trace of embryos.

I might here mention a strange find, though in no way suggesting that it has anything to do with this viviparous skink. At Nyingwa, about 7,000 feet, no sign of a live lizard was seen during the week we were there, but on 16. x. 26 I found six lizard eggs beneath a thick matting of moss in the rain-forest. I measured them and found they were 10 × 7 mm.; the only other possible suggestion could be that they belong to *S. kilimensis* or possibly some chameleon.

Diet. The stomach contents of five specimens examined were as follows: (i) Smooth-skinned lepidopterous larva. (ii) Coleopterous larva. (iii) Beetles. (iv) Beetles. (v) Beetles, woodlouse, spider.

Habitat. All the examples taken were more or less concealed in the rich leaf-mould underneath logs; these were in, or on the edge of, the rain-forest.

Scelotes tetradactyla (Peters)

Sepsina (Rhinoscincus) tetradactyla Peters, 1874, Monatsber. Akad. Wiss. Berlin, p. 374.

1 (M. C. Z. 24203) Mkarazi, Uluguru Mtns., 22. x. 26.

Variation. 26 scale-rows instead of 24, 5 supraciliaries on one side, 6 on the other instead of 4.

Coloration. The black lines following the longitudinal scale-rows, and the blue network on the tail, are only very faintly indicated. The colouring of the upper surface would be best described as iridescent steely-brown.

Measurements. This male is larger than the type, and measures 133 (92 + 41) mm.; possibly the tail is reproduced, as was that of the type according to Boulenger. The latter measured 120 (82 + 38) mm.

Diet. A woodlouse was in the stomach of this skink.

Habitat. Taken burrowing into the mould beneath a log on the roadside a hundred yards beyond the ford across the Mvua River on the Mkarazi-Tawa Road.

Distribution. The type, collected by Hildebrandt in 1874, was described as from the 'Zanzibar Coast'; since then Nieden has recorded one collected by Böhm at Marungu and three collected by Brown at Milanji. In the British Museum are specimens from the Shiré Highlands and Zomba, Nyasaland.

Melanoseps ater longicauda Tornier

Melanoseps ater var. *longicauda* Tornier, 1900, Zool. Jahrb. Syst., **13**, p. 602.

1 (M. C. Z. 24235) Vituri, Uluguru Mtns., 27. x. 26.

Variations and Relations. Owing to the end of the tail being missing it is with great misgivings we refer this skink to Tornier's subspecies. As it stands it is nearer to Gunther's *M. ater* from the Zambesi, agreeing with that reptile in having 22 mid-body scale-rows and not with *longicauda* in having 19. It has 144 scale-rows from chin to vent as against 118–120 in Tornier's two types from Masailand and Kerogwe[1] (latter locality at foot of Usambara Mtns.). Our reason for employing this name is to emphasize its identity with one taken on the Mkata Plains (near the Station and River) in 1921. The points in which that skink differed from Tornier's types have already been mentioned.[2] Vituri is about fifty miles from Mkata Station as the crow flies, although the habitat conditions could scarcely be more different. It is probable that Tornier's name will not stand but it seems advisable to await the collection of more material before placing it in the synonymy.

Color in life. Above, uniformly steely blue-black. Below, very slightly paler, except for the rostral, supranasals, mental, postmental and first lower labials, which are china-white.

Measurements. Male, from snout to vent 124 mm.; end of tail missing.

Habitat. Taken beneath a log in the rain-forest in a ravine, which is the first on the left as one enters the forest at Vituri on the path to Nyange. The spot was close to the base of a big rock over which a stream trickled, which must be a considerable waterfall in the rainy season so that the place must be constantly moistened with spray.

For three days I made persistent efforts to secure another specimen in this ravine but without success, though many caecilians were turned up during the hunt.

[1] 'Karagwe am Panani.' The first word would appear to be a misspelling for Kerogwe, which is on the Pangani.

[2] Loveridge, 1923, Proc. Zoöl. Soc., Lond., p. 963.

CHAMAELEONTIDAE

Chamaeleo dilepis dilepis Leach

Chamaeleo dilepis Leach, 1819, in Bowdich, 'Miss. Ashantee,' p. 493.

2 (M. C. Z. 24246) Nyange, Uluguru Mtns., ix–x. 26.
2 (M. C. Z. 24248) Amani, Usambara Mtns., 26. xi. 26.
1 (M. C. Z. 24249) Sakkarani, Usambara Mtns., 18. xii. 26.

Kangawingo (Kikami); *luvi* (Kisumbara). Not specific.

Distribution. Also found at Bagilo, and nine previously taken at Mkuyuni, Uluguru Mountains. It must not be supposed that because this series is small *dilepis* is less common in the Uluguru Mountains, though this was the case in the Usambaras, where *fischeri subsp.* is the dominant chameleon. In the Uluguru *dilepis* is plentiful; about a score were dispatched alive to the London Zoölogical Gardens and the natives were then discouraged from bringing them in.

Color in life. ♀. Amani. Above, bright yellow-green with darker green saddle-like markings and some yellow spots on the hind limbs, lumbar region and tail, a violet-brown spot behind each occipital flap and a broad streak of same on flank. Below, ventral crest, praeanal region and lower side of limbs white.

Diet. (i) Leaf-like wings of some large orthopteran and the head of an ant (?) in the stomach of the Nyange adult. (ii) Grasshoppers in young Nyange chameleon. (iii) Stomach and intestines of Amani ♀ crammed with coleopterous and orthopterous remains.

Folklore. The Wakami have the following story of this reptile. Once upon a time the chameleon challenged a lion to a race; they lined up for the start but as the lion sprang forward the *kangawingo* grabbed its tail and clung on. The lion ran for all it was worth and the chameleon held on for dear life. On reaching the winning post the lion sank down to rest, at which the *kangawingo* cried out, 'Look where you are lying or you will crush me.' The lion was astonished and dispirited on hearing the chameleon's voice and exclaimed, 'What! can you really outrun me?' The reptile replied, 'Of course I can and as a matter of fact have been waiting for you to come in.'

This story seems to us the African counterpart of our fable relating to the choosing of a king by the birds, when the eagle was outwitted by the wren which hid itself in the former's plumage.

Parasites. A new species of nematode worm (*Physaloptera ortleppi*) as well as *Strongylurus brevicaudata*, were taken in the intestines of chameleons collected at Dodoma.

Chamaeleo dilepis quilensis Bocage

Chamaeleo dilepis var. *quilensis* Bocage, 1866, Jorn. Sci. Lisboa, **1**, p. 59.

16 (M. C. Z. 24250-9) Ifakara, Mahenge, District, ix. 26.

Thirty individuals in all were brought back by a native who was sent to the Iringa highlands to get some chameleons there. Young *dilepis dilepis* is rather hard to distinguish from this race, as the occipital lobes are not so developed in their young as in the adults.

Chamaeleo fischeri subspp.

One of the principal objects of the expedition was to collect sufficient topotypic material to throw light on the strange distribution of the alleged races of this interesting chameleon. As a result, over four hundred examples were collected from the four type localities (and intermediate places) of the four races said to occur in the Eastern and Western Usambaras.

As sixty of the chameleons were brought back alive and left at the Zoölogical Gardens, London, only three hundred and eighty-four were at our disposal for study; these may be summarized by locality as follows:

♂♂	♀♀	Locality	Is Type-Locality of
52	28	Amani and Derema, Eastern Usambaras	*C. f. matschiei* Werner *C. f. vosseleri* Nieden
	2	Mlalo near Ambangula, Western Usambaras	*C. f. werneri* Nieden
4		Bumbuli north of Ambangula, Western Usambaras	
12	5–Y	Sakkarani north of Ambangula, Western Usambaras	
148	63	Phillipshof near Lushoto, Western Usambaras	*C. f. multituberculatus* Nieden
43	14–3	Mlalo near Hohenfriedeberg, Western Usambaras	(? *C. f. werneri* Nieden)

Topography

Nieden, in 1913, gives the distribution of the races of *fischeri* as follows:

C. f. fischeri Reichenow.

Nguru Mtns. and Unguu Mtns. (Is not the latter a corruption of the former?)

C. f. matschiei Werner.

Amani, Magrotto, Nguelo, Derema in Eastern Usambara.

C. f. vosseleri Nieden.

Amani, Magrotto, Nguelo, Buloa near Tanga, Ukami and Usaramo.

C. f. werneri Nieden.

Mlalo and Ambangula in Western Usambara.

C. f. multituberculatus Nieden.

Phillipshof near Wilhelmstal in Western Usambara.

The following notes on the type localities may help to elucidate matters.

C. f. fischeri Reichenow.

Chamaeleon fischeri Reichenow, 1887, Zoöl. Anz., **10**, p. 371.

The Nguru Mtns. lie about halfway between the Usambara and Uluguru Mtns., that is to say, from sixty to ninety miles from each.

The female of *C. f. fischeri* is still unknown; in all probability when it is found it will be similar to that of *C. f. matschiei* and cause the latter to fall into the synonymy of the former.

C. f. matschiei Werner and *C. f. vosseleri* Nieden.

It will at once be observed that the ranges of these two races overlap considerably, and more strangely still, *C. f. vosseleri* was also described from Ukami (i.e. Uluguru Mtns.) and Usaramo (i.e. in the Dar es Salaam District) as far to the south of the Nguru Mtns. as are Amani, Nguelo etc. to the north. 'Buloa near Tanga' is, we imagine, Bulwa near Amani, in Tornier (1897). Eismann's specimens are recorded as from 'Buloa bei Tanga in Usambara.'

C. f. werneri Nieden.

This subspecies was described from 'Mlalo and Ambangula in West Usambaras,' thus ruling out Mlalo near Amani in East Usambara Mtns. Ambangula lies five miles due north of Kerogwe station on the Tanga Railway. Mlalo, though rarely shown on maps, is a mile from Ambangula; obviously this is the Mlalo meant. The matter is complicated, however, since a male cotype of Nieden's *Ch. f. werneri* has been received in exchange from the Berlin Museum and is labelled 'Mlalo bei Wilhelmstal.' When Wilhelmstal was captured by the British it reverted to its native name of Lushoto. On arrival at Lushoto the junior author made very careful enquiries as to the whereabouts of this third Mlalo and found that the nearest known Mlalo was near Hohenfriedeberg, to reach which one passes through Phillipshof and so away to the north. To make assurance doubly sure a series of sixty specimens was obtained from this Mlalo also.

C. f. multituberculatus Nieden.

Phillipshof is a well-known resort a few miles out of Lushoto.

Chamaeleo fischeri matschiei Werner

Chamaeleon matschiei Werner, 1895, Verh. Zool. bot. Ges. Wien, p. 192, Pl. V, fig. 2.
Chamaeleo tornieri Werner, 1902, Zool. Jahrb. Syst. **15**, p. 417, Pl. XXIV (Mozambique)
Chamaeleo fischeri vosseleri Nieden, 1913, Sitzber. Ges. Naturf. Freunde, p. 241.

80 (M. C. Z. 24260–24285) Amani and Derema, Usambara Mtns., xi. 26.

Additional material. In addition to the cotype and topotypes mentioned above, others of three forms have been received by exchange from the Berlin Museum:

No. 20192. ♂ *Ch. f. fischeri* ex 'Buloa' (? Bulwa). Eismann coll.
20193. ♂ *Ch. f. matschiei* ex Amani. Vosseler coll.
20194. ♂ *Ch. f. vosseleri* ex Tanga. Reimer coll. A. *cotype*.

No. 20192is indistinguishable from 20194, which is not surprising, seeing that 'Buloa' is given as one of the type localities of *vosseleri*.

Variation. Males. These have dorsal spines on the anterior part of the back and usually, but not invariably, on the tail, which is sometimes perfectly smooth. When sorted by the presence or absence of spines on the tail it was observable that, in the main, the absence of spines is correlated with short horns and smaller size and is evidently a juvenile character; though one large well-developed male had a smooth tail, while four half-grown and two young specimens were in an intermediate condition. Other variations consist in the casque of the parietal region being plated or covered with small scales, or characterized by many intermediate stages between these two extremes. There is also astonishing variation in the breadth and length of the posterior part of the casque, which may be rounded or sharply pointed.

Females. No fewer than twenty of these twenty-eight females are hornless or exhibit only the faintest indication of horns in the form of a pair of angular swellings on the canthi. The remaining eight, which with two exceptions are much larger in size than the other twenty, have horns varying in length from 4 to 8 mm. (measured from anterior under side at base, to the tip). Horns in the female are therefore obviously an age character. This is corroborated by the fact that the dorsal crest in the horned females is slightly more developed than in the hornless, which are practically smooth. All agree in the non-spinous condition of the tail, which is usually absolutely smooth.

Coloration. In life these chameleons have a soft velvety appearance unlike any other species I have seen.

Measurements. The biggest male (24260) collected during the 1926 expedition measures 345 (130 + 195 + 20 mm. horn) mm., but is surpassed by No. 20193, which is 399 (147 + 234 + 18 mm. horn) mm.; the biggest female (24273) measures 284 (112 + 165 + 7 mm. horn) mm.; the smallest female (24285) measures 113 (46 + 73) mm. In this specimen there is only a slight swelling to indicate the position of the horns.

Breeding. Many of these females have very large ova or eggs.

Diet. About a dozen were examined which held beetle remains; some were those of brilliant green weevils. In addition to the beetles other insects were recognizable in six of the chameleons. These were (i) Grasshopper. (ii) Grass-

hopper. (iii) Grasshopper and caterpillars. (iv) Orthoptera and a caterpillar. (v) A bug like a frog-hopper. (vi) Hemipteron.

Parasites. Larval mites (Erythraeidae) were collected from these reptiles, and nematodes (*Strongyluris gigas*) were almost invariably present.

Habitat. Several which I captured personally were ascending trees at the edge of the forest. Most of the others were taken on bushes.

Chamaeleo fischeri multituberculatus Nieden[1]

Chamaelean fischeri multituberculatus Nieden, 1913, Sitzber. Ges. Naturf. Freunde, Berlin, p. 247.
Chamaeleon fischeri werneri Nieden, 1913, Sitzber. Ges. Naturf. Freunde, Berlin, p. 243.

2 (M. C. Z. 24286–87) Mlalo near Ambangula, Usambara Mtns., xii. 26.
4 (M. C. Z. 24288–91) Bumbuli, Usambara Mtns., xii. 26.
18 (M. C. Z. 24292–308) Sakkarani, Usambara Mtns., xii. 26.
211 (M. C. Z. 24309–360) Phillipshof, Usambara Mtns., xii. 26.
60 (M. C. Z. 24361–72) Mlalo near Hohenfriedeberg, Usambara Mtns., xii. 26.

Relationships. *C. f. werneri* Nieden, 1913, has page precedence over *C. f. multituberculatus* but is preoccupied on account of *C. werneri* Tornier, 1899, which is an entirely different reptile from Southern Tanganyika Territory. This is fortunate, as the name *multituberculatus* is well chosen and at once defines the principal difference between the males of the Western and Eastern Usambara races. These reptiles also differ in that the females of *multituberculatus* are invariably horned. *C. f. werneri* from Mlalo near Ambangula is probably somewhat of an intermediate. There are males in our Phillipshof series with similar crests to that which is figured and described for *C. f. werneri.*

Variation. Males. A series of spines, usually uninterrupted from nape to the middle of the tail, but sometimes very low or interrupted in the sacral region. The teeth composing this crest may be continuous or with small interspaces between each two; they may also be flat (i.e., blade-like) or cone-shaped, the two types being very different in appearance. There is great variation in the horns, which are usually more or less parallel to one another, though they frequently meet at the points and sometimes, though rarely, diverge as in *Ch. tavetensis* (which, however, is quite distinct). The horns may project in the line of the body axis or tilt upwards; in a few specimens they are decidedly down-pointing. Some of the horns have grown in peculiar twisted fashion, doubtless as a result of injury received when young; one such pair lean well to the right. The parietal crest may extend right to the end of the casque or be but a small raised crest in the middle of that area. The parietal region on either side of the crest may

[1] Though *Ch. f. werneri* has page precedence over *Ch. f. multituberculatus,* the latter name must be used, as *Ch. werneri* is preoccupied.

be raised with a swollen appearance, which is a sign that the reptile is well nourished, or deeply sunken, saucer-like, the evidence of a starved condition. The posterior edge of the casque may be sharply defined, upstanding (famished) or sunken into the outline of the back (well fed); quite apart from this there is astonishing individual variation — in some the posterior edge of the casque terminates in a sharp point, in others it is broad and spiky, or again broadly rounded with scarcely noticeable projections.

Females. One of the best features by which to differentiate *matschiei* and *multituberculatus* is that every female in the Western Usambara series is horned, almost to the same extent as the males, while in the females from Eastern Usambara the majority are hornless. The two topotypic females of *werneri* have rostral processes 3 mm. long exactly like the typical female, but they can be matched by specimens in the Phillipshof series which perhaps are not so advanced as is usual in females of *multituberculatus* of the same size.

Coloration. The chameleons with a pair of white lines on the belly are always females but the absence of such lines is *not* evidence that the reptile is a male. These lines in males are usually a sign of youth, being present in young specimens, and they are generally wanting in adults although occasionally persisting in large individuals.

Measurements. Largest male measures 319 (137 + 175 + 7 mm. worn horn) mm.; largest female 272 (112 + 148 + 12) mm.; youngest male 118 (51 + 65 + 2 mm. horn) mm.; youngest female 95 (42 + 53 + swelling not projecting beyond snout) mm.

Breeding. One of the two Mlalo (near Ambangula) females had undeveloped ova, the other held small eggs of 7 mm. diameter on 31. xii. 26. Eight out of fifteen collected at Phillipshof on 20. xii. 26 showed developing eggs. These varied in number from ten to twenty-one, more or less, depending on the size of the mother. The development is best shown thus:

10 eggs measuring	17 × 9 mm.	16 eggs measuring	7 × 7 mm.
11 "	" 14 × 7.5	16 "	" 14 × 8
12 "	" 15 × 8	17 "	" 14 × 8
13 "	" 13 × 8	21 "	" 15 × 8

Diet. Chiefly coleoptera and orthoptera.

Defence. The fact that the horns of all the biggest males are worn down to half the length of those of the younger males in their prime is surely evidence that these are used as fighting weapons, as is the case with *C. jacksoni vauercsccae.*

Parasites. Larval red mites of the family Erythraeidae (*Pterygosoma* sp.) were numerous, and nematodes (*Strongyluris brevicaudata*) are almost invariably

present. After the chameleons were chloroformed and soaked over night in water, they were transferred to formalin; then round worms would appear, attempting to escape from the nostrils, mouth or anus.

Enemies. In the garden of Lushoto Hotel, I shot a White-breasted Crow (*Corvus albus*) which was being fed by its parents on a chameleon. Fifty feet away I caught a Boomslang (*Dispholidus typus*) with a chameleon in its stomach.

[Chamaeleo fischeri excubitor (Barbour)]

Chamaeleo tenuis excubitor Barbour, 1911, Proc. Bio. Soc. Wash., **24**, pp. 219–220.

We take this opportunity of pointing out that this chameleon from Mt. Meru district of Kenya Colony represents a race of *fischeri* in which the male is hornless. The type is a male and not a female as was at first supposed.

Chamaeleo deremensis Matschie

Chamaeleon deremensis Matschie, 1892, Sitzber. Ges. Naturf. Freunde Berlin, p. 103.

1 (M. C. Z. 24234) Nyange, Uluguru Mtns., 11. x. 26.
1 (M. C. Z. 24236) Vituri, Uluguru Mtns., 30. x. 26.
3 (M. C. Z. 24237–9) Amani, Usambara Mtns., 24. xi. 26.
2 (M. C. Z. 24240–1) Derema, Usambara Mtns., 30. xi. 26.
1 (M. C. Z. 24242) Bumbuli, Usambara Mtns., 14. xii. 26.

Coloration. In life these are a beautiful dark-green with lighter green and mauve markings. Matschie does not exaggerate when he speaks of it as a magnificent species with its three long horns and sail-like dorsal crest.

Measurements. The largest male measured 328 (165 + 140 + 23 mm. nasal horn); largest female 295 (158 + 137) mm. Both Derema, i.e., topotypes, yet exceeding the types in size.

Breeding. The Derema and Bumbuli females have their ova in much the same stage of development, i.e., about 8 mm. diameter and spherical. An 83 mm. (snout to vent) Amani male is interesting as it shows the advanced age at which the horns first appear, for in this specimen none of them are over 2 mm. long.

Diet. (i) Many hard-shelled beetles, including *Macropoda tuberculifera* or allied species. (ii) Beetles, grasshopper and caterpillar. (iii) Weevil and other beetles, two large green locustids, two green stick insects and a spider. (iv) Beetles of many species, chiefly weevils, orthopteran, mantid, snail. (v) Beetles of many species, a millipede and skink scales. The only skinks seen in the plantation where this chameleon was caught were *Mabuya comorensis* and *M. v. varia.* (vi) Many weevils, grasshopper, millipede. By reason of their diet consisting so

largely of beetles and orthoptera these chameleons are of no small economic value to coffee planters and should be strictly preserved.

Defence. The claws of a struggling *deremensis* tear one's skin (epithelium) very easily. The horns are doubtless used for fighting; the nasal horn of the Nyange male (which was only 4 mm. short of being the largest male) measured 23 mm., while its occipital horns were 26 and 27 mm. respectively.

Parasites. Many nematodes were found in the Derema and Bumbuli specimens.

Distribution. Described from Derema and later recorded from Massailand and Usaramo (i.e., Dar es Salaam District); the present are the first records of its occurrence in the Uluguru Mountains.

Habitat. At edge of forest in most localities. At Derema they occur in coffee plantations which within the last decade were forest land.

Chamaeleo spinosus Matschie

Chamaeleon spinosus Matschie, 1892, Sitzber. Ges. Naturf. Freunde Berlin, p. 105.

1 (M. C. Z. 24243) Amani, Usambara Mtns., 26. xi. 26.

Measurements. A female which measures 66 (40 + 26) mm. and is therefore somewhat smaller than the type from Derema, which was 87 mm.

Chamaeleo tenuis Matschie

Chamaeleon tenuis Matschie, 1892, Sitzber. Ges. Naturf. Freunde Berlin, p. 106.

2 (M. C. Z. 24244–5) Amani, Usambara Mtns., 27. xi. 26.

Measurements. The male measures 101 (48 + 53) mm., and the female 129 (62 + 67) mm. The male is far larger than the type from Derema, which was only 69 mm. They were taken together in long grass on Mt. Bomoli. Werner (1911) has recorded this species from Ukami (i.e., Uluguru).

Rhampholeon brevicaudatus (Matschie)

Chamaeleon (*Brookesia*) *brevicaudatus* Matschie, 1892, Sitzber. Ges. Naturf. Freunde Berlin, p. 107.

6 (M. C. Z. 24373–8) Bagilo, Uluguru Mtns., 13–27. ix. 26.
1 (M. C. Z. 24379) Nyange, Uluguru Mtns., 1. x. 26.
2 (M. C. Z. 24380–1) Mkangazi, Uluguru Mtns., 12. x. 26.
3 (M. C. Z. 24382–4) Vituri, Uluguru Mtns., 29. x. 26.
1 (M. C. Z. 24385) Amani, Usambara Mtns., 24. xi. 26.

Lwivi (Kikami); *luvi* (Kisumbara). It will be observed that this is the only species of chameleon that the Wakami have a special name for, and it is very similar to that employed by the Wasumbara for all species of *Chamaeleo* and *Rhampholeon*.

Variations. In his description of the female type from Derema, Matschie's measurements show that the tail is one-sixth the total length from snout to tip of tail, or three and one-third the body length alone, yet in the text he says 'less than one-fifth the body length,' which is somewhat ambiguous. In the present series of four females the tail is included in the snout-to-vent measurements 4.08 to 4.83 times; in the nine males, 2.21 to 3.75 times, which gives one a ready means of sexing these creatures by the longer tail of the male. In this small series the average of both sexes is 3.63 times.

Measurements. The largest male (Nyange) measures 94 (72 + 22) mm.; the largest female (Bagilo), 92 (75 + 17) mm.

Breeding. The largest female, taken at Bagilo 13. ix. 26, held four eggs; these measured approximately 6 mm. in diameter. At Vituri on 30. x. 26 two females were taken beneath large stones on the banks of a stream at the edge of the forest. I assumed at first that they had burrowed beneath the stones to lay their eggs, but while one had six enlarged eggs measuring 10 × 6 mm., the other was scarcely adult (61 mm. over all) and its ova were not developed.

A female was taken at Mkangazi on 12. x. 26 with 4 eggs each 6 mm. in diameter. On the same day, while on the march, Salimu secured the smallest specimen I have ever seen; it walked comfortably into the end of Ramazan's flute, which had a diameter of half an inch. There Salimu attempted to imprison it by plugging the aperture with some wool. Ramazan, not knowing it was there, removed the plug and played lustily on the flute as he brought up the tail end of the safari. The loss to science was learned only when he marched tootling into camp! Salimu seized the flute, but the chameleon had departed.

Diet. Stomach contents: (i) Spider. (ii) Hard-shelled beetle. (iii) Reddish grasshopper. (iv) Grasshopper. (v) Cricket. Three others examined were empty.

CAECILIIDAE

Scolecomorphus vittatus (Boulenger)

Bdellophis vittatus Boulenger, 1895, Proc. Zoöl. Soc. Lond., p. 412, Pl. XXIV, fig. 4.

1 (M. C. Z. 12179) Bagilo, Uluguru Mtns., 29. ix. 26.
1 (M. C. Z. 12180) Nyange, Uluguru Mtns., 4. x. 26.
4 (M. C. Z. 12181–4) Vituri, Uluguru Mtns., 28–30. x. 26.
3 (M. C. Z. 12185–7) Amani, Usambara Mtns. xi. 26.
1 (M. C. Z. 12188) Mt. Lutindi, Usambara Mtns. 10. xii. 26.
1 (M. C. Z. 12189) Phillipshof, Usambara Mtns. 24. xii. 26.

Mvuvi (Kikami); *blafa* (Kiluguru); *mango* (Kisumbara).

Relations. The examination of the skull of a topotypic specimen of *B. vittatus* shows that the character of 'Eyes distinct' which separates the genus from *Scolecomorphus*, whose eyes are below the cranial bones, is a sign of youth, ossification developing with age so that the eyes of adults are concealed.

Variation. 122–148 annuli, previous known range being 125–148. The very strong palatal teeth, four to six in number, appear to have escaped the original describer. The eye, visible in the 160 mm. type, is indistinguishable in specimens of 200 mm. and over. The younger the specimen the sharper its snout. The position of the tentacles alters in relation to the apex of the lower jaw; in the young they lie well in front, while in the two largest specimens they are on either side of the apex. The type is in poor preservation, little more than skin and vertebrae, hence the 'much flattened' habit; though living specimens are depressed, the impression is not nearly so marked as one might be led to suppose.

Coloration. In life. No. 12179. Above, glossy purplish-black. Below, pink except under side of tail, which is pure white. — No. 12188. Above, purplish-black; below, mauve. When picked up, this specimen during its struggles exuded a sticky substance in considerable quantities, the mauve colouring coming off on my hands.

Coloration. In alcohol. With one exception all these specimens have the blue-black upper surface sharply defined from the yellowish under side. The exception is No. 12183, in which the pigmentation of the upper surface irregularly encroaches on the lower surface. The transitional stages from the narrow blue-black dorsal band of the Amani topotypes to the complete blue-black upper surface of the Uluguru specimens are well shown in this series.

Measurements. Lengths range from 140 to 300 mm., mid-body diameters from 5 to 9 mm., such diameters being contained in the lengths from 25 to 36.1 times.

Diet. The Nyange specimen held a smooth-skinned green caterpillar. The stomachs of half-a-dozen other caecilians which were examined were found to contain a white floury- or cheese-like mass impossible of determination.

Defence. See coloration.

Parasites. Minute nematodes (*Aplectana loveridgei* sp. n.) present in Nyange and Vituri stomachs.

Habitat. Concealed in leaf-mould beneath rotting logs in the damp rain-forest at Bagilo. The Nyange caecilian was also beneath a log in a similarly moist situation but it was on the surface and wriggled away as the log was overturned. The large Lutindi specimen was beneath a log in very dry forest but only fifty yards from a stream. The Phillipshof example was also in dry forest but close to a stream.

Distribution. There is in the British Museum a specimen, identified by Mr. G. A. Boulenger, from Mombasa, Kenya Colony, collected by Dr. S. L. Hinde in 1909.

Scolecomorphus uluguruensis sp. n.

(?) *Scolecomorphus kirkii* Loveridge (not of Boulenger), 1925, Proc. Zoöl. Soc. p. 765. Small dried specimen from Bagilo.

3 (M. C. Z. 12190–12192) Bagilo, Uluguru Mtns., ix. 26.
129 (M. C. Z. 12193–12293) Nyingwa, Uluguru Mtns., x. 26.

Type. No. 12193. Museum of Comparative Zoölogy. Sex ♂. From Nyingwa, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 19th, 1926.

Paratypes. The Nyingwa specimens enumerated above.

Diagnosis. The type of *S. kirkii* has been examined and compared with some of the Nyingwa specimens. It is intermediate between *S. uluguruensis* and the species about to be described, in its 152 circular folds and its diameter into total length, which is 38.57 (to 44) times; but above all it differs very much in colour, which is dark olive above and brownish olive below (in alcohol).

Description. Habit like *Hypogeophis*, head very small, body round, thick and heavy, tail blunt. Snout prominent, obtusely acuminate, projecting far beyond the lower jaw. Teeth well developed, 16 upper, 12 lower and 6 strongly recurved palatine teeth. Eye hidden. Tentacle round, exsertile, situated in a horseshoe-shaped groove opening anteriorly, just behind an imaginary line connecting the nostril with the apex of the lower jaw, below and behind the nostril but much nearer the mouth than the nostril. 133 annuli (124 to 151 in count of forty Nyingwa paratypes; it appears probable that males range from 124 to 139 and females from 140 to 151 but some overlapping may occur); annuli on the nape very pronounced, giving an upward tilt to the head in adults (in the young this area is as smooth as in adult *B. vittatus*); after first 14 (14 to 20 or thereabouts) rows on nape the annuli are interrupted on the vertebral line to the end of the tail (but not interrupted on the last inch of body and tail in most paratypes); anal opening close to tip of tail, penis extended in type.

Coloration. In alcohol. Above, dull blue-grey (sometimes glossy in males) inconspicuously merging into the somewhat more plumbeous grey of the lower surface; throat, and a similar or more extensive area in front of anal opening, white (*in life* this is bright flesh-pink).

Measurements:

Total length of type	215 mm.	Diameter at mid-body	9 mm.
Diameter at mid-body	9 "	Smallest specimen	140 "
Largest specimen (♀)	342 "	Diameter at mid-body	6 "

This species becomes proportionately more slender with age, though this does not appear at first sight and one would be apt to assume that the contrary was the case. It is best shown in the following table.

The average number of times the diameter is included in the length of:

14 specimens over 140 but under 200 mm. in length is (the range being from 21.4 to 27.7 times)	24.1 times
96 specimens over 200 but under 300 mm. in length is (the range being from 22 to 33.1 times)	26.4 times
19 specimens over 300 but under 342 mm. in length is (the range being from 25 to 34.3 times)	29.9 times

Breeding. Four embryos were present in one of the oviducts of a 305 mm. female; one such embryo (unstraightened) measured 13 mm., the eye was very, distinct.

Diet. A cheese-like substance in many stomachs, probably the remains of macerated termites.

Distribution. From 6,000 to 7,500 feet in the Uluguru Mtns.

Habitat. Taken in sodden leaf-mould beneath rotting, moss-grown logs in the rain-forest, generally in clearings caused by the fall of trees.

Scolecomorphus attenuatus sp. n.

2 (M. C. Z. 12194–5) Nyingwa, Uluguru Mtns., x. 26.

Type. No. 12194. Museum of Comparative Zoölogy. Sex ♀. From Nyingwa, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 15th, 1926.

Paratype. No. 12195 collected October 19th, 1920.

Diagnosis. Teeth apparently somewhat smaller than in *S. uluguruensis.* Snout more bluntly rounded. Habit much more slender, the diameter being contained in the total length 39 to 45 times as against 24 to 29 times. When the type was brought in with a number of *S. uluguruensis* I was immediately struck by its long slender habit and jet-black color.

Description. Habit more like *S. vittatus,* head very small, body roundish, slender, elongated. Snout bluntly rounded, projecting far beyond lower jaw. Teeth numerous, minute; 6 palatine teeth (actually 5 discernible). Eye hidden. Tentacle round, exsertile, situated in a horseshoe-shaped groove opening anteriorly, just behind an imaginary line connecting the nostril with the apex of the lower jaw, below and behind the nostril but much nearer the mouth than the nostril. 146 annuli (125 in paratype); the folds on nape not pronounced, so that the head is in the same axis as the body; after the first few folds on the nape the rest are interrupted on the dorsal line to end of the tail.

Coloration. Above, glossy black, below, uniformly grey-black except on the throat and a similar, or more extensive, area in front of the anal opening, which is white in alcohol and in life.

Measurements:

Total length of type.....	360 mm.	Total length of paratype.....	255 mm.
Diameter at mid-body.....	8 "	Diameter at mid-body.....	6.5 "

Diameter contained in the total length from 39 to 45 times.

Boulengerula boulengeri Tornier

Boulengerula boulengeri Tornier, 1897, 'Kriechthiere Deutsch-Ost Afrikas,' p. 164.

57 (M. C. Z. 12296–12345) Amani, Usambara Mtns., 20–30. xi. 26.
1 (M. C. Z. 12346) Kizerui, Usambara Mtns., 8. xii. 26.

Mcudi in Kisumbara.

Variation. Annuli were counted on 54 specimens and were found to range from 125 to 135 (average 129). Diameter into length 3 to 7 times.

Coloration. In life. Adults. Above, bluish-grey with a darker band along the back. Below, bluish-grey except throat which is pinkish flesh-color. Young. These are much more worm-like in appearance as they are largely pinkish flesh-color with the dorsal band showing pinkish-mauve. The very small Kizerui caecilian differs from all the Amani specimens in being pale grey with a dark-grey band (in alcohol).

Measurements. The largest measures 278 mm. in length with a diameter of 6.5 mm., while the smallest is only 80 mm. long with a diameter of 2.3 mm.

Breeding. In three females examined the ovules were small.

Diet. One had the whole alimentary canal crowded with remains of termites, another the cheese-like or floury substance already referred to in connection with other species.

Enemies. Six were recovered from the stomachs of snakes (*Elapsoidea guentheri*); three of these had the flesh digested from the skulls while the rest of the body was in excellent preservation; two others had evidently only just been swallowed; five in all were preserved.

Habitat. Under logs in damp spots. The smallest (Kizerui) specimen was beneath a log lying some fifty feet distant from a stream.

Boulengerula uluguruensis sp. n.

Boulengerula boulengeri Loveridge (not Tornier), 1925, Proc. Zoöl. Soc., p. 765. Specimen from Mkuyuni, Uluguru Mtns. 142 annuli.

4 (M. C. Z. 12347–50) Bagilo, Uluguru Mtns., 20–30. ix. 26.
12 (M. C. Z. 12351–62) Nyange, Uluguru Mtns., 1–9. x. 26.
20 (M. C. Z. 12363–82) Vituri, Uluguru Mtns., 27–30. x. 26.
7 (M. C. Z. 12388–91) Mkarazi, Uluguru Mtns., 20–22. x. 26.

Mvuvi in Kikami.

Type. No. 12367. Museum of Comparative Zoölogy. From Vituri, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 28th, 1927.

Paratypes. Thirty-nine specimens as listed above.

Diagnosis. Distinguished from *B. boulengeri* of the Usambara Mtns. by its more numerous annuli, having from 132 to 148 as against 125 to 135. The average of forty specimens is 136 as against an average of 129 based on fifty-four examples of *B. boulengeri*. The colour of the new species is totally different in life from that of *boulengeri*, and in alcohol it lacks the dorsal pigmentation of that species.

Description. Essentially like *B. boulengeri* except in those features which have already been emphasized in the diagnosis. Habit slender, vermiform. Snout obtusely pointed, projecting far beyond the lower jaw. Eye indistinguishable. Tentacle round, exsertile, surrounded by a circular groove placed about half-way along the head just above the middle of the upper jaw. 147 annuli (132 to 148 in paratype series); the folds are interrupted on the middle dorsal line in the centre of the body but not on nape and tail.

Coloration. In life. Above and below, a rather transparent, but livid fleshy-pink; posteriorly some white stippling is visible with the aid of a lens. Its general appearance is very worm-like.

Coloration. In alcohol. Opaque and colourless; with a lens a dorsal band can be detected in a few of the paratypes but not in the type.

Measurements. Total length of type 272 mm. Diameter at mid-body 5 mm. The type is the largest specimen; the smallest measures 130 mm., with a diameter of 3.5. The average length of the whole series is 202 mm. The diameter is included in the total length from 3 to 6 times.

Breeding. A Vituri female captured 28. x. 26 holds some enlarged ova measuring 4 × 2.5 mm.

Diet. Termites and indeterminate insect (? ant) remains.

Habitat. The whole of the Bagilo and Nyange series were taken by natives when hoeing in their gardens on the edge of the rain-forest, or in turning over heaps of rotting grass and weeds. I personally captured three of the Mkarazi specimens in beetle borings in a very sodden, rotten log in the dry forest close to the Mvua River.

PIPIDAE

Xenopus laevis (Daudin)

Bufo laevis Daudin, 1803, 'Hist. Nat. des Rainettes,' p. 85, Pl. XXX, fig. 1.

4 (M. C. Z. 12384–7) Bumbuli, Usambara Mtns., 14. xii. 26.

Kikolwe ya maji in Kisumbara.

Variation. In only one specimen are the first and second fingers of both hands relatively proportioned, the first finger being either shorter than, equal to, or longer than, the second on one hand but not on the other. The tentacles are very short.

Coloration. The flanks and hind limbs are unusually well spotted.

Measurements. Largest measures 68 mm. from snout to vent.

Diet. Three of the four specimens held very large *Xenopus* tadpoles in their stomachs.

Xenopus mülleri (Peters)

Dactylethra mülleri Peters, 1844, Monatsber. Akad. Wiss. Berlin, p. 37.

1 (M. C. Z. 12383) Dar es Salaam, 4. xi. 26.

Diet. In the stomach of this frog were masses of frog's eggs as well as a beetle larva and the elytra of a twenty-spot ladybird. There is no doubt about the ova being in the stomach. This specimen was merely taken for record, the species being very abundant at Dar es Salaam at the time of my visit.

Correction. The junior author takes this opportunity of correcting an error in his recent paper on East African Batrachians,[1] where a record of *Xenopus laevis*, collected at East London, Cape Colony, is shown under *X. mülleri*. The sentence commencing 'Others . . . crabs' was intended to be added to the end of the preceding paragraph ending 'Kafuro'; by an oversight he failed to correct it in proof.

[1] Loveridge, 1925, Proc. Zoöl. Soc. Lond., p. 767.

BUFONIDAE

Bufo brauni Nieden

Bufo brauni Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 147.

25 (M. C. Z. 12392–416) Bagilo, Uluguru Mtns., ix. 26.
1 (M. C. Z. 12417) Nyange, Uluguru Mtns., 11. x. 26.
3 (M. C. Z. 12418–420) Mkarazi, Uluguru Mtns., 22. x. 26.
34 (M. C. Z. 12421–444) Amani, Usambara Mtns., xi. 26.
1 (M. C. Z. 12445) Bumbuli, Usambara Mtns., 14. xii. 26.

The Wakami natives have only one name for the Salientia, with the exception of Brevicepitids. This name is *butwa* for a largish toad or frog, and it has the usual prefixes, viz., *kibutwa* for a small toad, *vibutwa* for many small toads and *mabutwa* for many large toads. *Shembumi* is the Wasumbara equivalent.

Coloration. In life. Nieden's description is excellent: in two ♀ ♀ specimens before us the dark band commences *anterior* to the eye and terminates *just behind* the fore limbs; the under surface is creamy yellow, not white in life; in one example there is a series of large, light-edged, black blotches of irregular outline on the posterior part of the parotids and the anterior part of the back. The reason for these irregular blotches is appreciated only when the creature is seen among the dead leaves which carpet the forest floor — its natural habitat. These toads are rendered so inconspicuous that I have often almost trodden upon them.

Measurements. The largest female (Amani) measures 110 mm. The smallest toad (Mkarazi) 10 mm.

Breeding. Masses of black-and-white eggs in the two females taken at Bagilo on 14. ix. 26. Another female from the same place, but brought in two days later, immediately started spawning; several others examined were likewise full of eggs. Very young toads were taken at Nyange and Mkarazi; those from the last-mentioned locality were beneath a log in the road which passes through the dry forest.

Diet. Eleven toads were examined and their stomachs found to contain: (i) Grasshopper. (ii) Locust, cockchafer, beetle. (iii) Orthopterous remains and a large weevil. (iv) Carabid beetles and a large piece of gravel. (v) Carabid beetles. (vi) Many carabids. (vii) Large curculionid. (viii) Many beetles. (ix) Beetles. (x) Beetles. (xi) Beetle and small millipede.

Habitat. Essentially a rain-forest species but still numerous in the remnant of primaeval forest capping the hill at Bumbuli in the Western Usambaras. Usually where *brauni* occurs, *regularis* is absent, but when both have been recorded, as at Nyange and Amanis so far as my experience goes *regularis* is confined to cleared plantations or the swampy non-forested valleys. It seems

strange that *brauni*, which is so abundant in its type locality Amani, should have escaped description until 1913. On the evening of our arrival, having climbed up a thousand feet from the valley, we were walking up the path to Dr. Braun's house when a toad hopped across our way, being revealed by the light of the lantern we carried. It was a big *Bufo brauni* and a happy augury of the topotypic material which was to be collected at this spot.

Intelligence? As there was an excess of bluebottles in the batrachian cage I introduced a very large chameleon (*C. d. dilepis*) to assist in their reduction. Instead of doing so the foolish reptile went black to match the soil and pawed the glass of the vivarium. I returned after a short absence and found it lying on its side with little more than the head raised from the ground; its black pupils, surrounded by their orange circles, roved about incessantly but the rest of the reptile remained quiescent. Then a strange thing happened. A large *Bufo brauni* emerged from its retreat, stole forwards with its gaze directed towards the mobile eyes of the chameleon. It halted all alert beside the reptile's head. Suddenly 'Plop!' out went the toad's tongue at the chameleon's eye! The reptile scarcely moved. The toad drew back and surveyed the situation, then leaning forwards eagerly, tried again and yet again. In all I saw it make four attempts before I took compassion on the chameleon and removed it from the cage. The incident, however, does not speak very well for the reputed intelligence of the genus *Bufo*.

Bufo regularis Reuss

Bufo regularis Reuss, 1834, Mus. Senckenberg., **1**, p. 60.

1 (M. C. Z. 12446) Nyange, Uluguru Mtns., 5. x. 26.
1 (M. C. Z. 12447) Vituri, Uluguru Mtns., 9. x. 26.
1 (M. C. Z. 12448) Mkuyuni, Uluguru 18. x. 26.
7 (M. C. Z. 12449) Dar es Salaam, 4. xi. 26.
1 (M. C. Z. 12450) Bagamoyo, 11. xi. 26.
1 (M. C. Z. 12451) Kizerui, Usambara Mtns., 9. xii. 26.
2 (M. C. Z. 12452–3) Bumbuli, Usambara Mtns., 14. xii. 26.
Spawn (M. C. Z. 12454) Bumbuli, Usambara Mtns., 14. xii. 26.

Variation. Young toads show no trace of the enormous tympanum of the adult. The presence or absence of a tympanum being a useful key-character, this observation is of some importance; it is based on two young Dar es Salaam toads which are 15 and 20 mm. long respectively. The tympanum in a 33 mm. specimen is already 2 mm. in diameter.

Coloration. The pair taken in the miry puddle at Bumbuli were absolutely as black as the mud when captured, but changed to their more usual colour and characteristic markings while being conveyed in a bag from the pool to camp.

Measurements. The largest toad, a female from Kizerui, measures 92 mm.

Breeding. At Mkarazi on 12. x. 26, a great number were calling from flooded fields in the valley. I watched three pairs in embrace and spawning. At Bumbuli on 14. xii. 26, a pair were taken in embrace in a miry puddle on the path where they had just spawned. At Lushoto on 19. xii. 26, a noisy company of Square-marked Toads were calling from the small duck pond in the hotel grounds; taking a lantern we went out to watch them inflating their enormous vocal sacs. Very young ones were collected at Dar es Salaam on 4. xi. 26.

Diet. Spider, grasshopper and many species of beetles found in the only stomach examined.

Habitat. At Dar es Salaam many were found beneath the trunks of fallen palms or inside their rotted interiors.

Folklore. Once upon a time some Wakami left their mountains to go to Bagamoyo. They walked from dawn to dusk before finding any water to drink. When they had made camp one of the party was told by his companions to go to the water hole and fetch water for the party. He went with a gourd and bailed it up with a coconut attached to a pole. Now this man, coming from a part of the mountains where these toads do not occur, was unacquainted with them. As he dipped his half-coconut into the water the toads started croaking and crurring. It being dark, he thought it was someone bidding him drink, in a strange tongue, so he replied, 'Yes, I will drink.' Again the croaking broke out, and again, wishing to be conciliatory in a strange land, he replied in the same fashion. This occurred so many times, however, that his stomach became dilated with the water he had consumed and he lay down, feeling unable to return to camp. After a while his companions came in search of him, roused him and demanded why he slept. He replied it was because he had drunk so much water. They asked the reason for this surfeiting when all his friends were awaiting his return and were so thirsty. 'Someone,' said he, 'invited me to drink again and again and I did not like to refuse.' 'It was not a man but a toad,' replied the spokesman. Thereupon they took up sods of earth with which they pelted him until he threw up the excess of water which he had taken and afterwards he was able to return to the camp.

Bufo micranotis Loveridge

Bufo micranotis Loveridge, 1925, Proc. Zoöl. Soc., London, p. 770.

1 (M. C. Z. 12455) Mkangazi, 12. x. 26.

The species is apparently rare, for particular search was made for it, yet this male, measuring 18 mm. in length, was the sole specimen obtained. It was brought,

together with an *Arthroleptis stenodactylus*, by a small boy who proffered it very diffidently amid the sarcastic comments and jeers of his companions who were too indolent to go hunting themselves. The double reward paid for it, however, transferred the right to smile to the child.

Nectophrynoides tornieri (Roux)

Nectophryne tornieri Roux, 1905, Proc. Zoöl. Soc. Lond., p. 63, Pl. II, fig. 4.
Nectophryne werthi Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 439.

14 (M. C. Z. 12456–469) Bagilo, Uluguru Mtns., 14. ix. 26.
3 (M. C. Z. 12470–472) Nyange, Uluguru Mtns., 6. x. 26.
62 (M. C. Z. 12473–495) Nyingwa, Uluguru Mtns., 15–19. x. 26.
55 (M. C. Z. 12496–520) Vituri, Uluguru Mtns., 25–30. x. 26.
12 (M. C. Z. 12521–532) Amani, Usambara Mtns., xi. 26.
3 (M. C. Z. 12533–535) Kizerui, Usambara Mtns., 8. xii. 26.

Kijula in Kisumbara.

Relations. *N. werthi*, based on seven specimens said to come from Dar es Salaam, is supposed to differ from *tornieri* in having a smooth instead of a warty skin, rounded instead of vertically oval tympanum, 'obtuse' instead of 'strong' canthus rostralis, and tibio-tarsal articulation of the adpressed hind limb reaching to between the eye and snout instead of to the posterior border of the eye.

Variation. An examination of the present series shows the most astounding variation from perfectly smooth skins through slightly rugose to warty specimens like the type of *tornieri* — not only warty, however, for in some specimens the warts are spinose on the supraocular and parotid region, in others of the same size such spines are represented only by rounded warts. The tympanum is present, absent, or scarcely distinguishable; 'roundish' or 'vertically oval' might equally well describe its shape. The canthi are sharp and distinct, no 'obtuse' ones being observed in this series. The tibio-tarsal articulations usually reach to the posterior border of the eye but many reach the nostril or between the eye and nostril.

Coloration. *In life.* Adult ♂. Bagilo. Above, almost uniformly red on all upper surfaces, a faint light line from the eye along the parotid glands; tubercles dusky grey; sides and whole of under surfaces marbled with grey.

Adult ♀. Bagilo. Above, bright rusty red, brightest on sides and hind limbs; centre of back yellowish; a single irregular black bar on tibia and another on the foot. Below, and on under surface of limbs, transparent white so that the dark internal organs in the chest region, and a cluster of eggs in the abdomen, are plainly visible.

The variability of the Nyingwa series needs to be seen to be fully appreciated. In life no two were alike in every detail and the variation defied description. Six were selected for brief notice.

(*a*) Above, dark olive, an indistinct yellowish band uniting the upper eyelids, one or two yellowish blotches on the back and a vertical line above the anus; flanks sharply defined from back by their clear cream color; limbs and toes yellowish, with bands of dark olive of the same density as the dorsal colouring. Below, transparent white, blackish on belly by reason of internal organs being full of food and showing through; some fifteen, round, cream-coloured spots scattered on the throat and belly. These spots look like gilt when the toad is alive.

(*b*) Dark reddish-brown, no bars on limbs, but a few scattered black spots on the upper surface; golden-cream spots on the throat and sides of belly, which also extend to the flanks and are more or less visible from above.

(*c*) Yellowish-brown above, darker brown on flanks; head, back, and limbs heavily sprinkled with red and black blotches and spots.

(*d*) Brown above, variegated with darker, a very broad white vertebral band from the snout to the anus. Below whitish, belly darker.

(*e*) Olive above, tinged with dark sepia; a white, ochre-edged, broad band unites the upper eyelids, rufous on the outside edge of the limbs.

(*f*) Above, variegated with light and dark brown, the whole of the upper and lower surface bespattered with golden-cream spots.

Measurements. Largest female (Nyingwa) measures 27 mm. All the largest specimens are females, and without dissecting the whole series it would be difficult to say which was the largest male, but one Bagilo male measured 25 mm. Smallest specimens 11 mm. Embryo in mother 7 mm.

Breeding. Nieden (1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 450), quoting Krefft, records the characteristic call, 'pink, pink-pink,' of this frog which he heard at Amani. There copulation took place in February and breeding in March which corresponds to the commencement of the big rains. They were certainly calling 'pink-pink' at Nyingwa in mid-October at a time when the females all held well-developed tadpoles. One is doubtful therefore whether it is a breeding call. We should suppose that in rain-forest the breeding season would not be well marked, and it may be merely a coincidence that at Bagilo in September the females held eggs, at Nyingwa in mid-October they held tadpoles, whilst at Vituri there were perfect little toads in their abdomens, these toads being without a trace of tail in the last week of October.

Four Nyingwa specimens examined hold 9, 19, 24 and 35 tadpoles respectively. One Vituri female had 27 frogs, and one could detect the presence of toads in the others through the transparent abdominal skin.

Habitat. Bagilo specimens were taken on rain-sodden, leaf-strewn paths in the rain-forest. The three Nyange toads were not taken in the valley but near the summit of Mt. Tongoni; the adult was found beneath a log, while the two juveniles were in a wild banana. At Amani they were found in domestic bananas (planted on cleared forest land) at 2,500 to 3,000 feet but were not abundant. At Kizerui they were found in both wild and domestic bananas.

It was not till the sixth day at Nyingwa that I discovered the true habitat of the species. By listening for the faint piping note, then marking down as nearly as possible the spot from which it apparently emanated, we secured several immature toads under the matted moss-like growth which carpeted the forest floor in places. On the sixth day I started opening bamboos and thereafter found an adult in about every tenth bamboo examined. Bamboos that had fallen over and were decaying were uninhabited, as were also bamboos that had been recently cut; the favored bamboos were those that had been cut by human agency and well weathered. Usually such bamboos were chopped off at a height of three or four feet from the ground and held a certain amount of water at the internode. The toads were found clinging to the inside wall of these stumps just above the water. They rarely made any attempt to escape until touched but were very likely to be overlooked by reason of their colouring, which more or less harmonized with the mouldy, variegated interiors of the bamboos.

Distribution. The Uluguru Mtns. are the very heart of 'Ukami,' so that all specimens from that range are topotypic. Krefft has already recorded *N. tornieri* from Amani.

Nieden described *N. werthi*, collected by Herr Werth, from Dar es Salaam, which is situated in the sandy coastal belt and which seems a most unlikely habitat, as the other members of the allied genus Nectophryne occurring in Africa are known only from mountain ranges or from the Cameroons. All are rain-forest forms.

During the nine days spent at Dar es Salaam vigorous search was made for this toad. Special attention was paid to the Botanical Gardens. After my experience with Nectophrynoides in the bamboos at Nyingwa (7,500 feet) I searched the Japanese and other imported bamboos in the gardens. Bamboo stakes which were used for supporting plants often contained water, but the only frog taken in this situation was an *Arthroleptis stenodactylus*.

As Nectophrynoides occurred in wild bananas in the Uluguru Mtns., I visited the fine banana plantation at the Roman Catholic Mission and the scattered bananas around the only two permanent swamps. These are approximately three miles south and east of Dar es Salaam. As these banana plants yielded Megalixalus and Hyperolius it is just possible that these tree toads may have become adapted to life in the coastal heat. At the same time, it is well to remember that Nectophrynoides occurs at higher altitudes than Megalixalus and Hyperolius in the mountains, and it was only when one came down to the comparatively low forest at Vituri that all three genera occurred together in appreciable numbers; even then Nectophrynoides was confined to the rain-forest and the others were taken in wild bananas on the outer fringe of the forest, or more often in ravines leading to it.

It seems more probable that *N. werthi* was imported into Dar es Salaam on some trees or plants for the Botanical Gardens and perhaps never became firmly established.

Nectophrynoides vivipara (Tornier)

Pseudophryne vivipara Tornier, 1905, Sitzber. Akad. Wiss. Berlin, II, p. 855.

32 (M. C. Z. 12536–66) Bagilo, Uluguru Mtns., ix. 26.
4 (M. C. Z. 12567–70) Nyange, Uluguru Mtns., 8. x. 26.
113 (M. C. Z. 12571–92) Nyingwa, Uluguru Mtns., 15–18. x. 26.
17 (M. C. Z. 12593–610) Vituri, Uluguru Mtns., 25–30. x. 26.

Relations. The East African representatives of the genera Nectophryne and Pseudophryne have been united by Noble under the name Nectophrynoides. For discussion on the matter see Noble, 1926, Am. Mus. Novit. No. 212, pp. 10–15.

Variation. The tibio-tarsal articulation of the adpressed hind limb usually falls short of the posterior border of the eye, though it may reach to the middle of the orbit apparently without relation to age or sex. By snout, which he says is a little longer than the diameter of the eye, the author means from the anterior border of the eye to the end of the snout. The orbital diameter exactly equals its distance from the nostril, which is nearer the end of the snout than it is to the eye. The interorbital space in the young is broader than the upper eyelid: it is only in adults that it is equal to the latter.

Coloration. In life. In coloration they are as variable as a chameleon, but unlike that reptile they appear to be unable to change rapidly to suit their habitat though it seems probable that they do so very slowly. Those taken among the dead leaves of the rain-forest at Bagilo were almost uniformly plumbeous-grey, elsewhere reddish-brown, pale green, or dark olive according to the state of the

leaves amongst which they occur. A young Bagilo toad, before me as I write, is a rich dark green heavily spotted with black.

At Nyingwa the variation in colour far surpassed that occurring in Bagilo. The lower surface was generally jet black but ranged from that to pure white. Seven Nyingwa specimens selected at random were marked as follows:

(*a*) Uniformly jet black above and below, except for the glandular regions on hind limbs, which are bright rusty brown.

(*b*) Like (*a*), but with a greenish vertebral patch, and the supraocular and glandular areas on the head, neck and limbs are pinkish-white. Below there are white spots and patches on the throat, breast and fore limbs.

(*c*) Also like the first, but the centre of the head and back are bright yellow while the glandular areas of the hind limbs only are pale ochre.

(*d*) In this individual all the upper surfaces are bright yellow except the parotid and other glandular areas, which are rufous; the sides of the neck and throat and under sides of fore limbs exhibit much white in sharp contrast to the rest of the under surface, which is black.

(*e*) Black above, except for an ochraceous-green dorsal stripe from nose to vent, which is crossed at right angles by a similarly coloured line from eye to eye; only the glandular areas of hind limbs differentiated by reddish-brown colour. Soles of the feet and under surface of limbs blotched with pure white, the rest of the lower surfaces being black.

(*f*) A half-grown toad. Uniformly black above and below except for a pair of parallel, yellow, dorsal stripes from the supraocular regions to the loins, and the metatarsal glands, which are buffish.

(*g*) Rufous-brown above, the glandular areas ochraceous-brown. Below, black except for a little white stippling on the lower jaws, and the pure white soles of all four feet.

Measurements. Largest male measures 56 mm.; largest female 60 mm. Both from Bagilo, but many females this size from other localities.

Breeding. An examination of females indicates a very definite breeding season, those from Bagilo, ix. 26, being distended with eggs; in one these measured 56 mm. diameter, in another embryos were plainly visible. At Nyingwa, 15–19. x. 26, all the larger females held tadpoles but no toads were found in the ten examined. At Vituri, 23–30. x. 26, only one held tadpoles; of these there were 135, each measuring 15 mm. long on 30. x. 26; another toad, taken the same day,

held 114 little toads, each measuring 6 mm. from snout to vent. Others examined also held toads.

Diet. Contents of thirteen stomachs, were: (i) Beetle. (ii) Beetle and *Phryniscus* whip-scorpion. (iii) Beetle and grasshopper. (iv) Beetle, grasshopper and termites. (v) Three heads of soldier termites. (vi) Beetle and spider. (vii) Spider and snail. (viii) Big polydesmid. (ix) Millipede and a large winged ant. (x) Several stink-ants. (xi) Woodlouse, tineid moth and five caddis larvae. (xii) Many caddis larvae. (xiii) A huge smooth-skinned caterpillar with a few hairs on it.

Defence. The enormous glands on the limbs of this toad alone suffice to distinguish it from all other East African Salientia. Under stimulus from chloroform, but not when anaesthetized by potassium cyanide, a copious thick, white, and viscous discharge is given off from the parotid and numerous tibial glands.

Habitat. The Bagilo series was taken on the sodden, dead leaves of the forest floor, or beneath damp, moss-grown logs. One at Vituri was found sitting on the top of a plant in the forest, its location being about a foot from the ground.

Their ventriloquial calls are rather confusing. At Nyingwa, while endeavouring to locate the piping of one of these toads in my vicinity, I examined a vertical stem of bamboo and discovered it was occupied by an adult male and female. In the course of a couple of afternoons, with the help of an assistant, I secured over fifty of these toads in bamboo stems. Generally only one toad was found in a stem, but quite frequently pairs were taken which, to judge by their relative sizes, were of opposite sex; in one instance they were in embrace.

In contradistinction to *Nectophrynoides tornieri*, which was found only in vertical stems, *N. vivipara* showed an undoubted preference for bamboos that had been cut and were lying at an angle among their fellows. Occasionally these toads were to be found in scraps of bamboo which were lying on the ground, but this was unusual. Like *N. tornieri*, they never made use of bamboos which were actually rotting. In examining small sections of bamboo, where there are no internodes the hiding toad may often be discovered by holding the bamboo up to the light, telescope-fashion. Here a warning may be given, for if there is an internode, or the section happens to be choked with leaves, the investigator will receive more than an eyeful of very dirty water in his face.

RANIDAE

Rana oxyrhynchus Smith

Rana oxyrhynchus Smith, 1849, 'Illus. Zoöl. S. Africa,' **3**, Pl. LXXVII, figs. 2 and 2a–c.

7 (M. C. Z. 12687–693) Dar es Salaam, 9. xi. 26.
12 (M. C. Z. 12694–705) Bagamoyo, 11. xi. 26.
1 (M. C. Z. 12706) Amani, Usambara Mtns., 20. xi. 26.

Coloration. In life. They were abundant along irrigation ditches at the Catholic Mission and in a marsh three miles south of Dar es Salaam. In the former location they were olive, or grey-green, or reddish; in the latter, which was on black cotton soil, they were as black as the mud.

Breeding. All except the Amani frog are half-grown specimens.

Diet. Of ten stomachs examined all except two held small grasshoppers. The exceptions were: (i) Cricket. (ii) Beetles and indeterminate insect remains.

Rana mascareniensis Duméril et Bibron

Rana mascareniensis Duméril et Bibron, 1841, 'Erpét. Gén.,' **8**, p. 350.

4 (M. C. Z. 126707–10) Dar es Salaam, 4. xi. 26.
3 (M. C. Z. 126711–13) Bagamoyo, 11. xi. 26.

Breeding. The males were calling in daylight at Mombasa on 3. v. 26. An adult female in the Dar es Salaam series is full of eggs but apparently not breeding.

Diet. A big spider in one, grasshopper remains in another.

Enemies. Captive Green Snakes (*Chlorophis neglectus*) fed upon these frogs at Dar es Salaam.

Rana nutti Boulenger

Rana nutti Boulenger, 1896, 'Ann. Mag. Nat. Hist.,' (6) **18**, p. 467.
Rana fuscigula Lönnberg (not Dum. and Bib.), 1907, p. 21.
Rana angolensis Lönnberg (not Boeage), 1907, 'Reptilia and Batrachia,' in Sjöstedt. Kilimandjaro-Meru Exped. 1, part 4, p. 22.
Rana nutti Lönnberg, 1911, Svensk Vetensk. Akad. Handl., **47**, No. 6, p. 26–27.
Rana delalandii Nieden (not Dum. et Bib.), 1915, Mitt. Mus. Berlin, **7**, p. 352–353.
Rana aberdariensis Angel, 1925, in 'Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912),' pp. 42–46, Pl. II, figs. 1 and 2.

22 (M. C. Z. 12611–620) Bagilo, Uluguru Mtns., 10. ix. 26.
1 (M. C. Z. 12816) Mkuyuni, Uluguru Mtns., 18. x. 26.
4 (M. C. Z. 12621–624) Mkangazi, Uluguru Mtns., 20. x. 26.
5 (M. C. Z. 12625–629) Mkarazi, Uluguru Mtns., 22. x. 26.
21 (M. C. Z. 12630–645) Vituri, Uluguru Mtns., x. 26.
74 (M. C. Z. 12646–660) Amani, Usumbara Mtns., xi. 26.
5 (M. C. Z. 12661–665) Bumbuli, Usumbara Mtns., 12. xii. 26.
11 (M. C. Z. 12666–675) Lushoto, Usumbara Mtns., 20. xii. 26.
49 (M. C. Z. 12677–685) Phillipshof, Usumbara Mtns., xii. 26.

Jula is Kisumbara for all frogs, doubtless derived from the Kiswahili *chura.*

Relations. Most of these agree in every detail with the long and careful description of *R. aberdariensis*, and with the illustrations, though the dermal folds are not usually so interrupted as in the figures. Another character distinguishing *aberdariensis* from *nutti* is 'first finger a little shorter than second,' which in the type of *nutti* was longer. Both conditions are to be seen in the present series, and in at least one individual they are to be found on its right and left hands respectively. While in the types of *nutti* the tibio-tarsal articulation was said to reach the extremity of the snout or beyond, in the present series it generally falls short, thus agreeing with the condition of the type series of *aberdariensis*. We have received a cotype of *R. aberdariensis* (M. C. Z. No. 13961) through the kindness of Mons. Angel, and regret that we cannot see sufficient grounds for recognizing it as distinct.

In 1907 Lönnberg, reporting on frogs from Mt. Meru in Tanganyika Territory, with Boulenger's approval referred six Meru frogs to *R. fuscigula* and a number of tadpoles and young frogs from Meru and Kibonoto to *R. angolensis*. In 1911 the same author, reporting on other frogs from Mt. Kenia and Meru, Kenya Colony, as well as Nairobi, referred his captures to *R. nutti* and has much to say of the difficulties of distinguishing *nutti, fuscigula* and *angolensis* (*delalandii*). We feel confident that Lönnberg's records of angolensis should be referred to *nutti*.

Nieden in 1915 considered *nutti* a synonym of *Rana delalandii* (*angolensis* Bocage) and recorded Amani specimens under this name. We cannot agree with this conclusion, however, as the seven examples from as many different localities in Angola and South Africa appear to have a much more pointed snout than has *nutti*.

On the other hand, *fuscigula*, of which we have a long series received from various South African museums, appears to be very closely allied to *nutti*, which, however, apparently attains a greater size in the tropical rain-forests of East Africa than it does south of the Zambesi; and in the East African *nutti* the tibio-tarsal articulation may extend beyond the end of the snout. It is probable that the relationship may best be expressed by making *nutti* a subspecies of *fuscigula* but we hesitate to do so until our knowledge of the ranges of the forms is more extensive.

Coloration in life. Specimens from a dark rock pool at Bagilo. ♀. Above, blackish, throat heavily marbled with black, only breast and under surface of thighs white. Others of both sexes taken in meadow land are various shades of green, olive, or brown.

Measurements. Largest males (Bagilo and Vituri) 74 mm.; largest females (Vituri) 110 mm. None of the Usambara series reached such a size, the biggest male (Amani) being 68 mm., and female (Bumbuli) 97 mm.

Breeding. The breeding season was apparently over in both ranges, as small specimens 22 to 30 mm. in length were taken in every locality except Bumbuli. At Bagilo young measuring 22 to 30 mm. were tailless; at Vituri one 23 mm. specimen had a stumpy tail, another 27 mm. had a tail 24 mm.; at Amani a 26 mm. frog was without a tail, while others from 25 to 27 mm. in length had tails.

The males had swollen pads on their hands; the females held pepper-and-salt ova, but none were found spawning.

Diet. The contents of ten stomachs examined was: (i) Five carabids. (ii) Two carabids. (iii) Three bugs. (iv) Six flat bugs, three caterpillars of which one was smooth and two large and hairy, millipede. (v) Millipede, hemipteron, ants, beetle. (vi) Millipede, caterpillar, cockchafer. (vii) Caterpillar, elater beetle. (viii) Hairy caterpillar, snail. (ix) Beetle larva and very large speckle-winged hemipteron. (x) Spider, crab and quantities of river gravel.

Enemies. At Bumbuli, at 3 P.M., I heard a rustling in the very dry grass and leaves just opposite the house. I went across to see what was the cause and found an exceptionally large frog sitting blinking with a great many small black ants biting it, particularly on the web and toes of the hind feet. I picked twenty-eight off it and quite as many dropped off as the frog was being anaesthetized. It appeared dazed and apathetic like a frog which is being swallowed by a snake. The sun was beating down upon it with withering heat.

Habitat. This large frog is quite common on the edge of the stream flowing below the Amani Institute. The frogs rest during the day in the short grass on the banks of the stream and take to the water when disturbed; the larger ones dive to the bottom, where they may be seen resting; the smaller ones, swimming rapidly under water, return to the bank, where they rest with just the head exposed until they consider the danger is past, when they clamber up the bank. In fast-flowing sections of the stream the largest frogs also pursued these tactics.

They are not nearly so hard to catch as *Rana mascareniensis* and our series were secured by my wife walking along the bank while I waded down the stream and marked the spot where the frog came to rest. I would then quietly place the net beneath the frog and a movement from my wife would scare it into the net. In this way we lost very few. The environment at Phillipshof was similar to that at Amani but here we did most of our catching at night. At night the frogs were in the short grass bordering the stream, often as much as ten feet away from it and doubtless hunting insects. One of us would skirt the stream carrying a

lantern and point out the frogs to the other; sometimes they appeared dazed and could be caught by hand, but more often took a leap for liberty at the last moment and landed into the net which was held ready.

At Bagilo they were found in pools in a rocky, rushing torrent, at Lushoto in an irrigation ditch close to the hotel. Curiously enough, only males were found in the ditch.

Rana fasciata merumontana (Lönnberg)

Rana merumontana Lönnberg, 1907, in Sjostedt, 'Kilimanjaro-Meru Exp.,' **1**, part 4, p. 21, Pl. I, figs. 4 a and 4 b. (Mt. Meru, T. T.)

106 (M. C. Z. 12715–35) Phillipshof, Usambara Mtns., 21. xii. 26.

Compared with R. merumontana. In 1905 the Swedish Expedition secured a single frog on Mt. Meru, T. T., at 3,000 metres; this became the type of *R. merumontana.* Phillipshof is also approximately 3,000 metres. The present series agree very closely with the description of this frog, and the illustrations given convince us that we are dealing with one and the same species.

While in the text the author has described the interorbital space as 'nearly twice as broad as the upper eyelid,' in his figure (as in the adults of the present series) it is one and a half times; in young specimens it is twice as broad, but the type was evidently adult (no measurements are given) for, he says, 'Skin smooth.' This is more or less the case in adults, though the dorso-lateral folds are distinguishable when sought for. In the young there are 6 to 8 well-marked latero-dorsal folds, all of them somewhat broken up. The length of the hind limb develops disproportionately with age, for in the young the tibio-tarsal articulation of the adpressed hind limb reaches just beyond the tip of the snout, while in adults it extends far beyond. The white line from the eye to the insertion of the fore limb shown in the figure is in reality a thickened ridge or raised band of skin very characteristic of the species, though not mentioned in the description.

Compared with R. fasciata. R. fasciata has never been recorded farther north than the Shiré Plateau of Nyasaland, but on comparing the Phillipshof series with specimens from the Cape, or the Transvaal, no structural difference can be detected, except the more pointed snout of *fasciata,* and the interorbital width. Twenty-three frogs from four localities between the Cape Peninsular and the Northern Transvaal range in body length from 20 to 48 mm., with hind limbs from 35 to 106 mm., the former being included in the latter from 1.7 to 2.3 times. An equal number of frogs selected at random from the Phillipshof series range from 29 to 44 mm., with hind limbs from 45 to 92 mm. the proportions being the same as in the South African series viz. 1.7 to 2.3 times.

Compared with R. fulleborni. In 1910 Nieden based the description of this species on a single 50 mm. frog obtained at 2,700 metres in a crater lake of the Ngosi Volcano. The only points in which it appears to differ from *merumontana* are: 'nostril distinctly closer to eye than to end of snout' as against equidistant (in the Phillipshof series it is equidistant in half-grown frogs, but closer to the eye in adults); a second character relates to the interorbital space, which in *fulleborni* is stated to be, 'as wide as upper eyelid" as against 'twice as wide' in *merumontana* or once and a half to twice as wide in the Phillipshof frogs. The author remarked that the species was very similar to *fasciata* but differs from that species in the throat having brownish spots.

Compared with R. stenocephala. This very long-toed species is closely related to, though quite distinct from, *Rana stenocephala* Boulenger from Entebbe, Uganda, of which there is a cotype in the collection of the Museum of Comparative Zoölogy. The characters in which the Phillipshof frogs differ from this cotype are as follows.

The head is broader and the snout more rounded and less pointed than in *R. stenocephala;* the head is one and one seventh as long as broad, while in this cotype of *stenocephala* it is one and one fifth (the original description says 'nearly once and a half'); the snout, which is a little more than twice the diameter of the eye, is less strongly projecting beyond the mouth than in *stenocephala;* the nostril is somewhat nearer the eye than the end of the snout, while in *stenocephala* it is equidistant; the interorbital space, said to be equal to the upper eyelid in the type, is one and a half times its width in this cotype, that is to say, exactly the same as in a Phillipshof frog of similar measurements; the tympana are also of equal size though not nearly as distinct in the Phillipshof frogs; the fingers, toes and webbing are alike in their proportions, but the Phillipshof frogs lack the 'very small, more or less distinct, outer metatarsal tubercle'; the inner is present and equally developed in both species; again, both agree in possessing 6 to 8 glandular longitudinal folds and the strong glandular fold from beneath the eye to the shoulder.

The differences between these closely related forms may be best summed up as follows:

Last three phalanges of 4th toe free, basal two webbed	*stenocephala*
Last four phalanges of 4th toe free, only basal joint webbed	1
1. Dorso-lateral skin folds very distinct, interorbital space not broader than upper eyelid	2
Dorso-lateral skin folds indistinct or broken up, interorbital space once and a half to twice as broad as upper eyelid. Throat immaculate	*f. merumontana*
2. Throat spotted	*f. fulleborni*
Throat immaculate	*f. fasciata*

Coloration. There is more variability in colouring among South African *fasciata* than between South African and Phillipshof specimens. The following minor differences between the present series and the type *merumontana* are recorded.

The black stripe from the snout ot the flank is invariably interrupted by a white streak just above the fore limb. The dorsal stripe is nearly always present but is occasionally absent. One of the striking features in the markings of *merumontana* is the absence of cross-bars on the hind limbs, a character which holds good in this large series, and a character which it shares with *stenocephala* and frogs from the Transvaal, Knysna and Grahamstown, though not with those from the Cape.

Measurements. The largest male measures 39 mm., the two largest females measure 46 and 45 mm. (the type of *merumontana* was 46 mm.); no others are over 38 mm., as the series is comprised of half-grown frogs.

Breeding. Not breeding in December, the ova are present but minute.

Diet. The examination of ten stomachs gave the following results: (i) Caterpillar. (ii) Caterpillar. (iii) Caterpillar. (iv) Coccinellid. (v) Two beetle larvae and a hemipteron. (vi) Two beetles, two craneflies. (vii) Two beetles, a cranefly, a grasshopper. (viii) Craneflies. (ix) Cockroach. (x) Spider. Besides these at least ten others were examined in which the stomach contents could not be identified with certainty.

Habitat. Found in a marsh of floating sudd upon which one could walk though often sinking knee-deep in water. This slender, agile frog runs rapidly over the grass in a rather mouse-like fashion; probably its enormously elongated fourth toe has something to do with this. As far as we are aware, no other East African Rana except *fulleborni* and *stenocephala* has such a long toe. It leaps only very occasionally.

Rana galamensis Duméril et Bibron

Rana galamensis Duméril et Bibron, 1841, 'Erpét. Gén.,' **8**, p. 367.
Rana merumontana Loveridge (not of Lönnberg), 1925, Proc. Zoöl. Soc., p. 774 (Kabare, Bukoba).

1 (M. C. Z. 12714) Bagamoyo, 11. xi. 26.

This very distinctively coloured species has been compared with specimens from Zanzibar and Tanganyika Territory received from the Berlin Museum. With these it agrees perfectly, as also with the brief description.

Rana adspersa (Duméril et Bibron)

Pyxicephalus adspersus Duméril et Bibron, 1841, 'Erpét. Gén.,' **8**, p. 444.
Maltzania bufonia Boettger, 1881, Abh. Senck. Ges., **12**, p. 418, Pl. 1, figs. 3a–e. (Senegambia.)
Rana maltzanii Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 34.
Rana adspersa Lönnberg, 1910, in Sjöstedt, Kilimanjaro-Meru Exp., I, part 4, p. 21. Pl. 1, fig. 3a and 3b.

1 (M. C. Z. 12686) Dar es Salaam, 4. xi. 26.

Variation. Boettger's *Rana bufonina* is said to differ from *adspersa* in the absence of longitudinal dorsal skin folds and ridges and in the larger tympanum. A comparison between Lönnberg's excellent figure of a not fully adult *adspersa* from Tanga, and Boettger's figures of his type of *bufonina* from Senegambia, will show how very similar in appearance are these two creatures.

On the basis of the material in the M. C. Z. we are able to state with conviction that Boettger's smooth-skinned 87 mm. type was only a young *R. adspersa*. The material referred to is as follows:

M. C. Z. No. 10369. Frere Town, Kenya Colony. Length 56 mm.
M. C. Z. No. 10367. Kilosa, Tanganyika Terr. Length 96 mm.
M. C. Z. No. 12686. Dar es Salaam, Tanganyika Terr. Length 98 mm.
M. C. Z. No. 10368. Nyambita, Mwanza, Tanganyika Terr. Length 109 mm.

The first three of these are dorsally smooth-skinned, showing a gradual development of lateral tubercles encroaching on the back. No. 10368 possesses a rough back similar to Lönnberg's figure, and comparable to the condition of the series of adult South African *R. adspersa* in the collection. Probably methods of preservation have as much to do with a strongly tubercular appearance as has age.

Diet. Stomach full of ants and sand.

Enemies. It had more than a score of dead soldier ants (*Dorylus nigricans* subsp.) attached to its limbs and belly.

Habitat. A half-grown specimen taken on the edge of a water hole close to Mogogoni Swamp.

Arthroleptides martiensseni Nieden

Arthroleptides martiensseni Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 445.

23 (M. C. Z. 12817–21) Bagilo, Uluguru Mtns., ix. 26.
1 (M. C. Z. 12822) Vituri, Uluguru Mtns., x. 26.
2 (M. C. Z. 12823–4) Amani, Usambara Mtns., xi. 26.
1 (M. C. Z. 12825) Mt. Lutindi, Usambara Mtns., 10. xii. 26.

Variation. The interorbital space equals the upper eyelid in large specimens. The deep concavity of the loreal region is as pronounced in the young as in the adults; but while in the young the nostril is midway between the eyes and the end of the snout, in full-grown frogs the nostril is once and a half to twice as far

from the eye as from the end of the snout. In very young specimens, and in one adult male, the tibio-tarsal articulation of the adpressed hind limb only reaches the end of the snout. The skin sometimes exhibits scattered flattened warts and in one presents quite a granular appearance.

Coloration. In life. ♂. Bagilo. Above, dark olive-green, lighter on thighs, the whole freely sprinkled with white; black blotches on back, and more or less well-defined bars on limbs. Beneath, grey, darker on throat, palms and soles, lighter on chest, abdomen and thighs.

♀. Sigi below Amani. This very reddish individual was taken in the river-bed on reddish soil. The larger ♂ from Amani was dark olive when found under a log on the hillside about thirty yards from a stream. It was put into a white linen bag to be taken back to camp; on removing it from the bag it was found to have changed to a pale leaf-green.

Measurements. The largest male (Bagilo) measures 74 mm.; largest female (Vituri) 59 mm. Smallest frog (Bagilo) 17 mm.

Breeding. The Vituri female was full of eggs; only one other large female was taken. Most of the Bagilo specimens were very young and were taken between the 15th and 20th of September.

Diet. The examination of eight stomachs gave the following results: (i) Grasshopper. (ii) Wasp. (iii) Beetles. (iv) Beetles and fly pupa. (v) Long-snouted hemipteron lantern fly. (vi) Four neuropterous nymphs and a large spider. (vii) Big spider. (viii) About twenty acacia leaf petals such as might have been floating on the surface of a pool.

Parasites. Worms of the family Physalopteridae were found in the stomach of an Amani frog.

Phrynobatrachus krefftii Boulenger

Phrynobatrachus krefftii Boulenger, 1909, Ann. Mag. Nat. Hist., (8) **4**, p. 496.

100 (M. C. Z. 52736–60) Amani, Usambara Mtns., 25–30. xi. 26.
46 (M. C. Z. 52761–75) Mt. Lutindi, Usambara Mtns., xii. 26.
3 (M. C. Z. 52776–78) Bumbuli, Usambara Mtns., 12. xii. 26.
7 (M. C. Z. 52779–85) Phillipshof, Usambara Mtns., 21. xii. 26.

Variation. Some of the above topotypes from Amani have been carefully compared with the female cotypes in the British Museum. The digital disks are very strongly developed in this Phrynobatrachus. In the types the tibio-tarsal articulation reaches to the end of the snout, or beyond. In the present series in some examples it only just reaches the eye, in others the snout or beyond, nor can this character be used for separating the sexes. There is, however, a remark-

ably interesting difference between the two, for in the males not only is there the ranid thickening of the thumb-pad, but the tubercles of the toes and metatarsal region have developed into sharp little spines. Curiously enough there are little spinose points on the backs of the males, while the dorsal skin of the females is perfectly smooth. These characters are probably of use only in distinguishing sexually mature males, as none of the small frogs seem to have them.

Coloration. In life. ♂. Above, olive with brown markings, slightly greenish on head; a fawn band, pinkish at its extremities, unites the upper eyelids; it is sometimes backed with a darker one; indications of another band at right angles to this one commence on the snout; hind limbs faintly barred with black, some white specks on sides of head, fore limbs and flanks. Below, upper aspect of lower jaw white, with minute brown specks; under aspect, a sharply distinct black line running right round jaw; throat bright crome, a dusky band across chest between fore limbs, breast and belly satiny-white with a few brown flecks, under surface of limbs yellowish-green with brown spots. Length 40 mm.

♀. The bright chrome-yellow throats are found only in the males; in the females they are white or greenish, as also in young immature frogs. The amount of marbling on the lower surface varies very much. Some females have a light band along either flank and a light band beneath the eye.

Measurements. The largest male measures 50 mm.; largest females all 40 mm. (type also 40 mm.). Smallest frogs 10 mm., at which size they first lose their tails.

Breeding. At Amani. After a heavy shower just before sunset on December 2nd, we heard the frogs calling energetically from the bottom of a ravine not very far from the Institute. We hastened down as the light was fading, and located the frogs in a trickling stream. The males were calling with vocal sacs inflated and we were able to watch them at close quarters. Others were in embrace and seemed to favour spots where water flowed beneath rocks, under which they would retire at the last moment. Spawn was found which already held small tadpoles; other free-swimming tadpoles with their hind legs showing were also collected. From subsequent observations it would appear that at this time of year, at any rate, the frogs may collect for spawning after any heavy shower.

Description of Tadpole. Length of body nearly twice the width; about one half the length of the tail. Nostrils slightly nearer tip of snout than eye. Eyes dorso-lateral. Distance between eyes somewhat greater than the width of the mouth. Spiracle on the left side, directed upward; much nearer the eye than to the posterior end of the body, visible from above and below. Anal tube horizontal, in the lower edge of the subcaudal fin, slightly bent to the right. Tail slightly more than four times as long as deep; sharply pointed; upper and lower fins

apparently rather narrow but poorly preserved. Buccal disk rather large and transverse. Upper lip slightly arched and edged with small horny teeth. Lower lip and sides fimbriated and with many blunt papillae. Two rows of fine horny teeth between upper lip and horny beak, which is wide, arched, and well developed, considerably overlapping the well-developed but much smaller lower beak. Posterior to the beak, three long parallel series of horny teeth. The mouth disk thus differs widely from Power's figure of *P. natalensis* (Trans. Roy. Soc. S. Afr. 14, 1927, p. 239, fig. 3) in having rows of denticles between the marginal row on the upper lip and the beak and the three long parallel rows posterior to the beak.

Color. Greyish above, whitish or transparent below. Tail finely speckled with dusky brown.

Diet. The examination of ten stomachs gave the following results: (i) Beetles. (ii) Beetle. (iii) Beetle larva. (iv) Larvae and spider. (v) Spider and ants. (vi) Large black ant, moth, hemipteron. (vii) Hemipteron. (viii) Hemipteron. (ix) Weevil, millipede, small crab. (x) Cockroach.

Habitat. The first specimen, a male, was taken in a banana plant! Whether this is usual in the non-breeding season I cannot say; it might explain the well-developed disks, but not the spines on the feet, which are sexual. No others were found in bananas. Over fifty were taken in a stream which cuts the Comcoro road or path; three were found in a marsh and many in the trickle of water in a ravine between the Institute and native village. Others were seen in a pool in the forest just below Derema house.

Those in the slow-flowing broad stream were usually found sitting in sunlit patches on spits of sand or exposed rocks. When approached they remained still for longer than most frogs but were exceedingly clever at hiding when once they moved. Generally they dived into the clear water and hid beneath a leaf or remained motionless on the gravelly bottom, where their colouring was admirably concealing. At Misalae they were seen in a stagnant stream which was exposed to the full glare of the sun as it flowed through a native plot. At Kizerui they occurred in pools and streams in the depths of the forest.

Phrynobatrachus acridoides (Cope)

Staurois acridoides Cope, 1867, Jour. Acad. Nat. Sci. Philad., **6**, p. 198 (Zanzibar).
Phrynobatrachus boulengeri de Witte, 1919, Rev. Zoöl. Africaine, **6**, ii, p. 225. (Beira and Coguna, P. E. A.); Procter, 1920, Proc. Zoöl. Soc. London, p. 413.
Phrynobatrachus natalensis (part) Loveridge (not of Smith) 1925, Proc. Zoöl. Soc. London, pp. 779–781.
Arthroleptis janenschi Ahl, 1923, Sitzber. Ges. Naturf. Freunde, Berlin, p. 100. (Tendaguru, near Lindi, T. T.)

60 (M. C. Z. 12805–910) Dar es Salaam, 6 and 9. xi. 26.
18 (M. C. Z. 12811–815) Bagamoyo, 11. xi. 26.

Relations. Thanks to the kindness of Mr. H. W. Parker we have recently received a cotype of *P. boulengeri* from Beira, Portuguese East Africa, which we have compared with Cope's original types and with the Dar es Salaam specimens listed above and find identical beyond the slightest question.

Zanzibar, the type locality of *P. acridoides*, is almost opposite Bagamoyo on the coast and not more than forty miles from Dar es Salaam. Nieden (1915) referred 71 specimens from Zanzibar, Bagamoyo and Dar es Salaam to *acridoides*, an undoubtedly correct decision.

A comparison of the description of *P. acridoides*, with the fuller descriptions of *P. boulengeri* and *A. janenschi* shows that they are all in absolute agreement with the characters given by Cope except that Ahl's *janenschi* is said to lack a conical papilla on the tongue, a feature that may well have been overlooked. Ahl's description is, indeed, a very excellent one of *P. acridoides* from Dar es Salaam.

In 1924 Noble,[1] on the basis of the variability of his huge series of *Phrynobatrachus natalensis* from the Congo and the published description of *P. boulengeri*, placed the latter in the synonymy of the former. This course was followed by the junior author in his 1925 paper cited above. The receipt of the cotype of *P. boulengeri* confirmed the conclusion already arrived at that *P. boulengeri* was a much smaller frog; Dr. Noble fully concurs in the conclusion that it is distinct from *P. natalensis*.

Distribution. East African specimens in the collection of the Museum of Comparative Zoölogy are from the following localities:

Kenya Colony: Frere Town, near Mombasa.
Zanzibar: Zanzibar (cotypes of Staurais acridoides Cope).
Tanganyika Territory: Gonya, Bagamoyo, Dar es Salaam, Duthumi, Tulo, Morogoro, Kilosa.
Portuguese East Africa: Beira (cotype of *P. boulengeri*); Masiene, near Chai-chai, Limpopo River.

Tendaguru is near Lindi on the littoral between Dar es Salaam and Beira. All the localities recorded above are on the coastal plain, or have a typical coastal fauna and an altitude of less than 2,000 feet.

Variation. The key character of the interorbital space, being narrower than the upper eyelid (*acridoides*) or a little broader (*boulengeri*), is of little use, for the interorbital space in the present series equals the upper eyelid or is a little narrower or a little broader. The tympanum, which is said to be distinct in the type, is just distinguishable below the postocular fold; toes, said to be two-thirds webbed in the type, are almost fully webbed in the present series except the last two joints of the fourth toe; the tips of the fingers and toes, said to be dilated in the type, are usually not dilated though sometimes slightly dilated; the tibiotarsal articulation of the adpressed hind limb reaches the posterior border of the

[1] Noble, 1924, Bull. Am. Mus. Nat. Hist., **49**, Art. ii, pp. 188–191.

tympanum or the tip of the snout or any point between these extremes; skin folds from the posterior border of the eye to the fore arm are conspicuous, but the convergent, then divergent, plicae from the orbits to the scapular region are scarcely distinguishable.

Coloration. A dorsal stripe, narrow or broad, present or absent. Juvenile specimens from a sandy water hole near Dar es Salaam were so extraordinarily like the grains of sand in colour that they could rarely be detected until they moved.

Measurements. The largest specimen, a female from Bagamoyo, measured 28 mm.; the smallest frog (Dar es Salaam) measured 11 mm.

Breeding. Nearly all the Dar es Salaam frogs are very small but exhibit no trace of tails, yet their presence showed that the breeding season was during the 'big rains' — March–May.

Diet. Beetles.

Habitat. They were found in the grass bordering the irrigation ditches in the Catholic Mission plantation, also around a small water hole dug in a sandy hollow near the sea and some three miles south of the town. When sufficiently alarmed the young frogs sprang into the water, but quickly struck out for the edge as if instinct warned them that the dangers of deep water might be greater than those of the land.

Phrynobatrachus ? ogoensis (Boulenger)

Arthroleptis ogoensis Boulenger, 1906 (for 1905) Ann. Mus. Stor. Nat. Genova, (3) ii, p. 162, Pl. 1, figs. 7 and 8. (Lambaréne, Ogowé.) Loveridge, 1925, Proc. Zoöl. Soc. London, p. 783 (Bagilo).

86 (M. C. Z. 12786–790) Bagilo, Uluguru Mtns., ix. 26.
50 (M. C. Z. 12791–795) Nyange, Uluguru Mtns., x. 26.
17 (M. C. Z. 12796–800) Mkangazi, Uluguru Mtns., x. 26.
4 (M. C. Z. 12801–804) Nyingwa, Uluguru Mtns., 19. x. 26.
Also seen at Mkarazi, Uluguru Mtns., T. T.

Relations. The two Bagilo frogs referred to *Arthroleptis ogoensis* by the junior author in 1925 are specifically identical with the present series from the Uluguru Mountains. Mr. H. W. Parker has sent us a topotype of *A. ogoensis* which has been examined by Noble, who was working here on amphibian generic characters at the time. He finds that it possesses the bony sternum and omosternum of Phrynobatrachus as defined by Hewitt, so that hereafter the species should be known as *Phrynobatrachus ogoensis* (Boulenger).

Arthroleptis rouxi Nieden (Buddu Forest, Uganda) has already been placed in the synonymy of *P. ogoensis* by the junior author. A careful perusal of the description of *Phrynobatrachus kinangopensis* Angel from Kinangop, Aberdare Mountains, Kenya Colony, shows that, like *A. rouxi* and the topotype of *ogoensis*

referred to above, it has the first finger shorter than the second; apart from this there is no difference between the two species except that *kinangopensis* is said to have the toes three-quarters webbed, and *ogoensis* nearly one-half webbed; in both it extends as a fringe nearly to the end or to the end. Without topotypic material we hesitate to consider *kinangopensis* definitely as a synonym.

There is, in fact, one doubt in referring Uluguru frogs to *ogoensis*. They agree in every respect when compared with the topotype except in colouring, for like *rouxi* and *kinangopensis* it possesses a vertical stripe, yet one of the types (fig. 8) also lacks this stripe and is coloured above exactly like the Uluguru frogs. It seems strange, however, that in such a long series — over 150 specimens — not a single Uluguru frog should have a dorsal stripe. West African frogs appear to be more spotted beneath than those from the Uluguru, where the throat only is besprinkled or blotched.

Variation. The sternum and omosternum are definitely bony. Digital disks are usually present though occasionally lacking; in the Nyingwa series, for example, both conditions are found, though the frogs are beyond question of one species. Minute spines on the back are more numerous in the males than in the females.

Coloration in life. Mkangazi specimen. Above, back olive, limbs yellowish, the whole variegated with dusky marks, some of which form bars on the limbs. Below, throat and belly satiny-white, the former characteristically speckled or marbled with black as well as the flanks, the edge of the lower lip presenting a chequered appearance.

Measurements. The largest specimen, a female from Nyange, measures 27 mm. None of the Bagilo series measure more than 25 mm. The smallest frog (Bagilo) measures 11 mm. and has a half-absorbed tail 5 mm. long.

Breeding. Nyange frogs were calling day and night in a marsh close to my tent; this was during the first eleven days of October. Females from all localities were distended with ova. Young measuring 12 mm. in length were taken at Nyange and Mkangazi. Evidently this species spawns twice a year in these mountains, namely, during the greater and lesser rains. Possibly the spines referred to above are present only during the breeding season.

Diet. Beetles.

Parasites. Red subdermal parasites are so frequently present upon frogs of this species in the Uluguru Mountains that they might almost be employed as an aid to identification!

Enemies. A large frog from Nyange has the right leg missing from well above the knee.

Habitat. At Bagilo, in quiet pools and backwaters of a swift mountain torrent. At Nyange, in soggy, poorly drained land with small stagnant pools which would normally dry up but for their renewal by frequent showers, as at the time of my visit.

Distribution. No sign of this species was seen in the Usambara Mountains, where it is replaced by the much larger *P. krefftii.* This is rather surprising, as the climatic conditions and environment appear ideal and one can but suppose that it is the competition of its near relative that has prevented its obtaining a foothold.

Arthroleptis stenodactylus Pfeffer

Arthroleptis stenodactylus Pfeffer, 1893 (1892). Kihengo, Tanganyika Territory.
Arthroleptis variabilis Matschie,[1] 1893. Buea and Barombi, Cameroon.
Arthroleptis whytii Boulenger, 1897. Kondowe to Karonga, Nyasaland.
Arthroleptis lonnbergi Nieden, 1915. Mombo, Usambara, Tanganyika Territory.
Arthroleptis methneri Ahl, 1924. Matumbi-Holen, Tanganyika Territory.
Arthroleptis brevipes Ahl, 1924, Bismarkburg, Togo.
Arthroleptis wahlbergii Procter (not of Smith) 1920, Proc. Zoöl. Soc., p. 414. Morogoro and Amani, Tang. Territory. Loveridge, 1925, Proc. Zoöl. Soc., p. 718. Uliya-Madazini Road, Morogoro District, Tang. Territory.

6 (M. C. Z. 13111–5) Bagilo, Uluguru Mtns., ix. 26.
13 (M. C. Z. 13116–20) Nyange, Uluguru Mtns., x. 26.
1 (M. C. Z. 13121) Mkangazi, Uluguru Mtns., 12. x. 26.
15 (M. C. Z. 13122–6) Nyingwa, Uluguru Mtns., x. 26.
2 (M. C. Z. 13127–8) Vituri, Uluguru Mtns., x. 26.
4 (M. C. Z. 13129–32) Dar es Salaam, 4. xi. 26.
9 (M. C. Z. 13133–7) Amani, Usambara Mtns., xi. 26.
1 (M. C. Z. 13138) Mt. Lutindi, Usambara Mtns., 10. xii. 26.
1 (M. C. Z. 13139) Bumbuli, Usambara Mtns., 12. xii. 26.

Variation. In 1920, when reporting on the junior author's collection of amphibia from Central Tanganyika Territory, Miss J. Procter referred specimens of this genus from the Uluguru and Usambara Mtns. to *A. wahlbergii*, *A. stenodactylus* and *A. whytii*. In 1925, in a paper on a second collection, the junior author followed Nieden and others in placing *whytii* in the synonymy of *stenodactylus* and recorded *A. wahlbergii*, *A. stenodactylus* and *A. adolfi-friederici* from various localities in the Morogoro District.

During the present expedition 276 frogs of this group were specially collected with a view to elucidating the relationships of these species. *A. stenodactylus* is evidently a frog with a wide range, both horizontal and vertical; on the present occasion it was taken at sea-level (Dar es Salaam) to 7,500 feet (Nyingwa). East African examples appear inseparable from Cameroon specimens in the collection of the Museum of Comparative Zoölogy. As a matter of fact *A. stenodactylus* has also been reported from Spanish Guinea.

[1] Recorded by Angel in 1925 as occurring at Gazi, Kenya Colony.

Supposed species	*A. stenodactylus Pfeff.*	*A. variabilis Mats.*	*A. whytii Blgr.*	*A. lonnbergi Nieden*	*A. methneri Ahl.*
DATE	1893 (1892)	1893	1897	1915	1924
Type Locality	Kihengo, Tanganyika Territory	Buea and Barombi, Cameroon	Kondowe to Karonga Nyika Platean, Masuku Mtns. Nyasaland	Mombo at foot of Usambara Mountains, Tanganyika Territory	Matumbi-Hohlen, Tanganyika Territory
Habit	—	—	—	Like *stenodactylus*	Body rather squat
Head	moderate	—	moderate, broader than long	"	broader than long
Snout	—	prominent but not sharp	rounded, as long as eye	"	rounded, as long as horizontal diameter of the eye
Canthus	—	—	obtuse	"	sharp and distinct
Nostril	—	—	a little nearer end of snout than eye	"	as far from the eye as tip of snout
Interorbital space	—	—	broader than the upper eyelid	"	broader than the upper eyelid
Tympanum	not nearly equal one-half eye diameter	distinct	two-thirds the diameter of eye	"	hardly half the diameter of the eye
Tongue	papilla present	papilla present	papilla present	papilla absent	papilla absent
Fingers	3rd not quite one and a half times as long as the second	3rd longer than 2nd	1st and 2nd equal, more than half as long as 3rd	Like *stenodactylus*	1st longer than 2nd, 3rd one and one-half times as long as 2nd, 4th one-half as long as first
Tips of fingers	not dilated	slightly but noticeably swollen	slightly swollen	"	not dilated
Tips of toes	—	—	—	"	not dilated
Sub-articular tubercles	exceedingly strong, projecting like a papilla	—	well-developed	"	very distinct
Metatarsal but no tarsal tubercle	—	single metatarsal	a very large compressed sharp-edged crescentic metatarsal	"	papilla-like, inner metatarsal tubercle large, shovel-shaped
Tibio-tarsal articulation reaches	eye	—	tympanum or posterior border of eye	"	eye
Skin	skin covered with small warts; when skin shrinks these warts are disposed longitudinally on folds	—	smooth, granulate on the flanks and belly	"	smooth above and below, sides covered with small warts

It then transpired that the key characters supposed to differentiate several alleged species were common to examples from several localities where large series were collected. For example, the tibio-tarsal joint of the adpressed hind limb is said to reach the tympanum or posterior border of the eye (*whytii*), between tympanum and eye (*brevipes*), eye (*stenodactylus, lönnbergi, methneri*); in series it may only just reach the tympanum or as far as the middle of the eye, a sexual rather than a specific character, the shorter limbed frogs being females.

The papilla on the tongue is absent in several half-grown frogs or is, at least, not to be detected, while it is present in other frogs from the same locality; in three out of the four Dar es Salaam specimens it seems to be lacking. The absence of this papilla was said by Nieden to be the only distinguishing feature differentiating *lönnbergi* from *stenodactylus*, while formerly it was supposed to be absent in the type of that species. Sometimes this papilla, as it lies in the little pit from which it springs, is flush with the level of the tongue and its prominence appears to depend not only on age but a good deal on the state of preservation of the specimen.

The shovel-like metatarsal tubercle so prominent in adults is small, but quite distinct, in the young (cf. examples from Victoria Falls, Zambesi River, W. S. Brooks *leg.*; curiously enough no very young specimens were met with during the present expedition) and serves to distinguish them at once from the young of *A. adolfi-friederici*, which has a rounded, more oblong tubercle.

It is, therefore, advisable to redescribe the species on the basis of this series only, and it will then be found to embrace every variation cited in the descriptions of the five species which we relegate to the synonymy of *stenodactylus*.

Description. A large species of stout habit, rather squat. Head moderate, broader than long, varying with sex; snout rounded, as long as the horizontal diameter of the eye; canthus rostralis obtuse or distinct (sharper in the young); nostril midway between eye and end of snout or a little nearer the end of the snout than the eye (both conditions occurring in adults from the same locality); interorbital space equals the breadth of the upper eyelid or is slightly narrower or slightly broader; tympanum distinct, one-third or two-thirds the diameter of the eye (its size develops with age as in *Bufo*); tongue with, rarely without, a conical papilla situated in a small pit on the front.

Fingers slender, unequal, their tips obtuse, slightly swollen but not dilated, 1st and 2nd equal, or 1st slightly longer or slightly shorter than 2nd, 1st longer than 4th, 3rd a little longer than 1st in females, once and a half to twice as long in males. Tips of toes slightly swollen, not dilated; toes without webs or with

the very slightest trace; a single inner metatarsal tubercle, large, shovel-shaped as in *Rana delalandii*, as long as, or slightly longer than, the inner toe; no outer metatarsal and no tarsal tubercle; subarticular tubercles on fingers and toes well developed, papilla-like; the tibio-tarsal joint of the adpressed hind limb reaches the tympanum or as far as the eye.

Skin smooth above, below smooth or subgranular, sides granulate or slightly warty; very occasionally a narrow vertebral ridge from snout to anus.

Coloration. In life. An adult breeding female from Nyingwa is fairly typical, though great range of variation occurs and the vertebral line is generally wanting.

Above, pale brown with a yellow, thread-like, vertebral line commencing on praefrontal region and continuing past the anus to the lower surface; it is crossed at right angles on the anus by a similar line extending across the hind limbs from metatarsus to metatarsus; the vertebral line is flanked on either side by dark brown, light-edged chains of markings typical of the genus; other light-edged, irregular, darker brown blotches towards the flanks; a very black canthal band, light-edged above, passes from end of snout through nostril and eye over the tympanum, where it terminates on a level with the buccal border; lips brown but heavily blotched with white; limbs barred with brown and speckled with white. Below, white with some brown on throat; two noticeable, elongate, brown blotches between fore arms, and brown marblings on flanks. Pupil black surrounded by a narrow gold ring; iris yellow, or golden, obscured by black specklings.

Five of the Amani specimens have immaculate throats, whereas all Uluguru frogs have the throat marbled. All the Dar es Salaam frogs (females) are immaculate on the throat, while two of them have each a broad, light, vertebral band.

Measurements. Largest males (Nyingwa, Amani, Mt. Lutindi) measure 35 mm.; largest females (Amani) 44 mm., others (Nyange) 42 mm. in length. The smallest male (Nyingwa) was 24 mm. and smallest female (Dar es Salaam) 20 mm.

Sexes. The sexes showed a marked disproportion, only fifteen males being taken as against thirty-seven females. The males may be distinguished readily by:

(i) Much longer 3rd finger, which is one and a half to twice the length of the 1st.
(ii) Smaller size, not exceeding 35 mm. in this series.
(iii) Darkly pigmented throat or chin.
(iv) Loose skin of vocal sac on throat.

Breeding. Two females and a male were brought to me at Nyingwa on October 18th, 1926, which had been taken in shallow burrows in the native gardens, together with their eggs. These numbered 33, 40, and 53 respectively, while a fourth lot numbered 80. In the last instance it may well be that two lots of eggs were lumped together, for the collector was uncommonly stupid and, disregarding instructions, had put the parent or parents in a receptacle with other frogs of the same species. Until a European verifies the taking of a male with the eggs it might be as well to accept with reserve the fact of a male guarding the eggs.

When at Vituri a fortnight later, I noticed a movement in some recently turned earth in the vicinity of my tent. Supposing some Lygosoma or Scelotes to be moving it, I pounced upon the spot and captured an *Arthroleptis stenodactylus;* upon turning her over the mass of eggs was easily seen through the transparent abdominal wall. She was placed in a tin of earth and immediately began to work herself backwards into the loose soil; her behaviour struck me as being very different from that of an imprisoned Rana, which would usually explore its prison and make every effort to escape by leaping against the glass cover, whereas the Arthroleptis settled down immediately.

The ovaries of Bagilo and Nyange frogs examined in September were developing well, indicating that breeding occurs from October to November in the Uluguru Mountains.

Diet. (i) Large orthopteran, related to *Centrophilus* (Mr. Nathan Banks informs us), cockroach and skipjack beetle. (ii) Grasshopper, cockroach and beetles. (iii) Grasshopper, cockroach and cricket. (iv) Two grasshoppers and beetles. (v) Grasshopper and beetle. (vi) Grasshopper. (vii) Cockroach, spider, mollusk. (viii) Acridian, centipede. (ix) Centipede and beetles. (x) Geophilid, 60 mm. in length.

Parasites. Red subdermal organisms on Bagilo frogs.

Enemies. Twice recovered from stomachs of *Natrix olivaceus* at Nyange. A *Chlorophis neglectus*, captured at Bagilo on 19. x. 26, held a frog in its mouth. Three were taken from the stomach of a single *Crotaphopeltis hotamboeia tornieri* at Nyange. Others were recovered which were doubtfully referable to this species or *A. adolfi-friederici.*

Habitat. The largest of the Dar es Salaam frogs was taken in a water-holding bamboo stake in the Botanical Garden. Most of the other specimens were captured beneath logs in the rain-forest, or brought in by natives who had hoed them up in their gardens.

Arthroleptis adolfi-friederici Nieden

Arthroleptis adolfi-friederici Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 440.

22 (M. C. Z. 13140–44) Bagilo, Uluguru Mtns., ix. 26.
2 (M. C. Z. 13145) Nyange, Uluguru Mtns., 11. x. 26.
2 (M. C. Z. 13146–47) Nyingwa, Uluguru Mtns., 6 and 18. x. 26.
6 (M. C. Z. 13148–52) Vituri, Uluguru Mtns., x. 26.
190 (M. C. Z. 13153–60) Amani, Usambara Mtns., xi. 26.
5 (M. C. Z. 13161–65) Mt. Lutindi, Usambara Mtns., 10. xii. 26.
2 (M. C. Z. 13166–67) Phillipshof, Usambara Mtns., 24. xii. 26.

Relations. Nieden compared this frog with *A. whytii* Boulenger (= *stenodactylus*), to which it bears a striking colour likeness and general resemblance. Constant features in which they differ, as demonstrated by the present series, are the longer hind limbs of *adolfi-friederici*, reaching to between the eye and snout or, in the case of males, not infrequently beyond; the rounded, not shovel-shaped, metatarsal tubercle, which is shorter than the inner toe; the well-developed disks of both fingers and toes (these strong disks appear in all ages and while, perhaps, usually rounded, they are very frequently sharply pointed as in *A. xenodactylus* Boulenger).

Coloration. The coloration is very variable, more noticeably so in life, when it tends to resemble the tones of the environment. Three half-grown Bagilo frogs and one Nyingwa frog exhibit a broad, white, median, dorsal stripe. In most specimens the middle of the belly is immaculate white but in some it is marbled like the throat and lower sides.

At Amani the variation exhibited was astonishing. Where bamboos shade the path, and bestrew it with their long white leaves, the frogs are white, or whitish, but retain their black markings. Fifty yards away, where the dead leaves are rufous-stained through contact with the red soil of which the path is composed, the frogs, particularly the smaller ones, were bright reddish-brown. On entering the nearby forest where black soil predominated, frogs were less plentiful but very dark in colour.

Measurements. Largest male (Bagilo) measures 32 mm., next largest (Phillipshof) 31 mm.; largest female (Amani) 42 mm., range of largest from every locality 38 to 42 mm. Smallest frogs at Amani, 8 mm.; at Bagilo, 12 mm.

Sexes. An interesting sexual difference, presumably developed for the breeding season, appears in one Bagilo male (13143) and one Phillipshof male (13167), where the second and third fingers exhibit on their inner side a series of tooth-like granules as figured by Boulenger for *A. poccilonotus* (1906, Ann. & Mag. Nat. Hist., Ser. 7, Vol. 17, p. 320, fig. 1). While the disks of the Bagilo male are sharply pointed, those of the Phillipshof frog are rounded.

Diet. (i) Big black ant. (ii) Two species of caterpillars. (iii) Cockroach. (iv) Cockroach. (v) Cockroach. (vi) Cockroach and big spider. (vii) Spider. (viii) Freshwater shrimp. Apparently the cockroaches, which are very common among the dead leaves frequented by the frogs, form one of their principal articles of diet.

Enemies. One from the stomach of a *Crotaphopeltis hotamboeia tornieri* at Vituri on 27. x. 26.

Habitat. The species seems to court sunlight at Amani, where the majority were captured in the mornings on leaf-strewn paths exposed to the full glare of the sun. See also remarks under coloration.

Arthroleptis schubotzi Nieden

Arthroleptis schubotzi Nieden, 1910, Sitzber. Ges. Naturf. Freunde Berlin, p. 440.

5 (M. C. Z. 13168–72) Bagilo, Uluguru Mtns., 16. ix. 26.

Variation. Described in 1910 from a single specimen taken in the Usumbura Mtns., of western Tanganyika Territory, it has since been recorded from Langenburg and west of Mpapua. Without any authentic examples for comparison, though the series agrees perfectly with the somewhat meagre description, the identification should be received with reserve. If, however, they are correctly determined, the author appears to have overlooked what is perhaps the most distinctive feature of this small species, viz., the numerous, almost spinose, tubercles on the tibia and foot. All agree with the type in that the tibio-tarsal articulation of the adpressed hind limb reaches the hinder part of the eye. The very slight dilations of the toes, and those of some of the fingers also, are more or less pointed in all five frogs.

Coloration. No colour description was given by Nieden. The following was made on day of capture. Above, grey, a somewhat indistinct chain of markings from the snout along the back to lumbar region, a black blotch above anus; two very striking black marks, one on either side, just in front of hind limbs; lips black, marbled with white; fingers and toes barred black and white, limbs barred with black especially noticeable on the tibia, bright red on loins and posterior aspect of thighs. Below, white, mottled or marbled with grey everywhere, but least conspicuously on the belly.

Measurements. The series measures 19, 19, 17, 17 and 16 mm. respectively; the type measures 21 mm.

Diet. The stomach of the only specimen examined contained a very small grasshopper.

Parasites. Small red mites on the thighs of one or two of the frogs.

Habitat. Among fallen leaves on a damp path in a very wet section of the rain-forest.

Arthroleptis xenodactylus Boulenger

Arthroleptis xenodactylus Boulenger, 1909, Ann. Mag. Nat. Hist., (8) **4**, p. 496.

13 (M. C. Z. 13173–177) Bagilo, Uluguru Mtns., ix. 26.
3 (M. C. Z. 13178–179) Nyange, Uluguru Mtns., 6 and 7. x. 26.
6 (M. C. Z. 13180–185) Mkarazi, Uluguru Mtns., 22. x. 26.
152 (M. C. Z. 13186–209) Amani, Usambara Mtns., xi. 26.
1 (M. C. Z. 13210) Phillipshof, Usambara Mtns., 27. xii. 26.

Variation. The character on which so much stress has been laid, that of the sharply pointed digital disks, is not specific: though it is usually present, many frogs have only rounded disks. The snout from the nostril is invariably *shorter* than the eye, *much* shorter in very young frogs. In both sexes the nostril is somewhat nearer the end of the snout than the eye, *not* equidistant. The first finger is *much* shorter than the second (stated to be shorter in the original description) and should therefore cause the species to fall into another section of Noble's key (1924, Bull. Am. Mus. Nat. Hist., vol. **49**, Art. ii, p. 199). The tibio-tarsal articulation of the adpressed hind limb reaches between eye and snout (as in type) almost invariably, but in occasional specimens it just falls short of the eye.

Coloration. In the field the junior author thought that he had two distinct species, so different are the sexes in appearance and colour. Some with flattened heads and very depressed snouts, which lack the typical chain of vertebral markings characteristic of the genus, being brown above (in alcohol), appear to be all adult females. The description of a Bagilo frog as taken down in the field was as follows. Above, yellowish-brown marbled with darker and stippled with white, a large orange blotch on the back just above the anal orifice (this spot spreads to right and left on to the thighs); sides dark brown separated from the dorsal colouring by a light pinkish-white line commencing on the snout and passing over the nostril and eye along the side to the hind limb; thighs and inner aspect of tibia of the same orange shade as the anal patch. Below, white marbled with greenish-grey, soles of feet darker, almost black.

Others were found in which, in addition to the large orange blotch, the typical vertebral chain of markings was also present, but the majority lacked the orange blotch and possessed the chain of dorsal markings. The adults of this type which were examined all proved to be males, and it appears to be the universal colouring

of the young also; presumably the females lose the markings as they become adult. Frogs of this type of coloration agree very well with the description of *A. reichei* Nieden except in the absence of papillae and in their size. *A. reichei* is evidently a much larger species, measuring 29 mm. in the type, while the type of *A. xenodactylus* was only 17 mm.

The colour in life of a Nyange frog of this male type was: Above, greenish-grey, a chain of brownish vertebral markings typical of the genus from snout to vent; groins and tibia rich vermilion, rest of exposed parts of limbs greenish-grey marbled with darker, one or two indistinct bands on the tibia; jaws and sides of body white, marbled or speckled with brown. Below, whitish, finely speckled on throat; under surface of loins and hind limbs vermilion to pink.

Measurements. The following measurements were taken of the last-mentioned individual:

Snout to vent	13.5 mm.	Length of tibia	10 mm.
Length of head	6.75 "	Length of foot	15 "
Breadth of head	7 "	Length of 4th toe	6 "
Diameter of orbit	2 "	Length of 3rd finger	3 "

Largest male measures 22 mm.; largest female 20 mm.; smallest frog 6 mm. (all Amani). In the Uluguru series the largest male (Nyange) measured 21 mm., and female (Bagilo) 19 mm.; smallest frog (Nyange) 7 mm.

Breeding. Many of the Amani frogs hold a few large ova, disproportionately large for so small a frog. Some of these frogs were found in bananas, and the eggs were plainly visible through the transparent skin of the belly.

Diet. Ants were found in one, and numerous amphipod crustaceans in two others, but in general the stomach contents are too small to be readily identified.

Habitat. Single specimens were found hiding under logs at Bagilo, Nyange and Mkarazi. The great bulk of the Amani series were taken hopping about among dry leaves in a shady grove of chinchona trees on Mt. Bomoli. The leaves in this grove were very dry on the surface but in some spots were slightly damp underneath, yet the whole place was literally alive with frogs of the genus Arthroleptis, of which four species were present. Others again were taken on paths in dry forest, and after a shower of rain some were found in long grass. Salimu secured nearly twenty fully grown adults in bananas; this may have some significance, as the greater number of those taken beneath the chinchona trees were very young or half grown.

Enemies. One recovered from the stomach of a young *Crotaphopeltis hotamboeia tornieri.*

Arthroleptis minutus Boulenger

Arthroleptis minutus Boulenger, 1895, Proc. Zoöl. Soc. London, p. 539, Pl. XXX, fig. 4.

9 (M. C. Z. 12826–30) Amani, Usambara Mtns., xi. 26.
10 (M. C. Z. 12831–35) Phillipshof, Usambara Mtns., 24. xii. 26.

Variation. These specimens answer perfectly to the description of *A. parvulus* Boulenger from Angola.

Since writing the foregoing some of these frogs have been submitted to Mr. H. W. Parker, who has kindly compared them with the types of *minutus* and *parvulus;* he says that they 'certainly agree better with *parvulus* than with *minutus*,' but points out that, without carefully studying the whole genus to appreciate the relative values, it is almost impossible to give a verdict as to the specific identity or otherwise of *A. minutus* and *A. parvulus*. He continues: 'They look different to me, *minutus* being larger and heavier, but I have found no definite character by which they can be distinguished. Before I could state definitely that they were conspecific I should like to see material from the intervening territories; all our specimens of *A. parvulus* (8) are from Angola, whereas all those of *A. minutus* (12) are from the eastern side of the Great Lakes. In passing, the record of the latter species from Portuguese Guinea (Boulenger, 1906, Ann. Mus. Civ. Genova, (3) **2**, 42, p. 161, Noble, 1924, Bull. Am. Mus. Nat. Hist. **49**, ii, p. 316) is an error; the specimen appears to belong to *A. gutterosus* Chabanaud.'

Hyperolius spp.

Owing to the unsatisfactory condition of this genus, its bad need of revision, the meagre descriptions of many of the species, and the difficulty of distinguishing species which have little but colour to separate them, though doubtless perfectly distinct, it is quite possible that some of the following examples of *concolor*, *mariae* and *puncticulatus* are wrongly assigned.

A large series was collected in the hope that it might clear up some of the existing difficulties, but the reverse rather seems to be the case.

Hyperolius concolor (Hallowell)

Ixalus concolor Hallowell, 1844, Proc. Acad. Nat. Sci., Phila., **2**, p. 60.

1 (M. C. Z. 13261) Mkarazi, Uluguru Mtns., 22. x. 26.

Variation. Structurally in agreement with topotypic material, the tibio-tarsal articulation reaching the eye.

Coloration. If correctly determined, this young 20 mm. frog differs from topotypic Liberian examples in being almost colourless when preserved; in place

of the dark backs of adult Liberian specimens there is only very minute stippling, nor does it show any trace of pink on thighs or feet. In this it is much more like Belgian Congo (det. Noble) and Bukoba (det. Loveridge) frogs in the M. C. Z. collection. From the under-mentioned Derema frogs it differs in having the thighs finely stippled; those of the Derema frogs are colourless, but Liberian specimens have a narrow line of stippling.

In life this frog was 'uniform pale satiny-green, ideally suited to the situation in which it was found — a banana stem.'

Hyperolius mariae sp. n.

Plate 3, Fig. 1

5 ♂♂ (M. C. Z. 13262–66) Derema, Usambara Mtns., 30. xi. 26.
8 ♀♀ (M. C. Z. 13267–71) Derema, Usambara Mtns., 30. xi. 26.
57 juv (M. C. Z. 13272–76) Derema, Usambara Mtns., 30. xi. 26.

Diagnosis. Nearest to *concolor,* from which it differs in the smaller size of the breeding adults and in the almost entire absence of any pigmentation on the thighs, which is probably a character of some importance as it is related to the amount of thigh exposed when the frog is at rest; pigmentation in the form of stippling is present on the thighs of our topotype Liberian specimens of *concolor* as well as on examples from the Congo and Tanganyika Territory.

If correctly referred to the new species, the juvenile frogs as well as one male and two females show by their canthal markings (lost in maturity) relationship with *puncticulatus* and *argus.* Indeed, except in the matter of size and markings, it is difficult to distinguish the new species, though it has apparently a greater amount of webbing on the hind feet though the character is not over-reliable in a large series.

In all probability the specimens from Derema referred to *concolor* by Nieden are identical with the form now described.

Type. No. 13267, Museum of Comparative Zoölogy. An adult female taken in sedges near the mill dam at Derema, Usambara Mtns., Tanganyika Territory. Collected on November 30th, 1926, by Mrs. M. V. Loveridge, after whom it is named.

Description. Head slightly longer than broad; snout rounded, slightly projecting, longer than the orbital diameter (reckoning snout from anterior border of eye); canthus rostralis distinct but rounded; loreal region vertical, very slightly concave; interorbital space twice as broad as upper eyelid (one and a half times in some female paratypes); transverse orbital diameter equals the

distance from the anterior border of the eye to the nostril, also the distance between the nasal openings (or longer than the internasal distance in some female paratypes); tympanum hidden. Fingers and toes moderate, dilated at their tips, fingers about two-thirds webbed, the web extending to the base of the disk of the outer finger, to the last joint but one on both sides of the third finger, between the last joint but one and the distal joint of the second, to the last joint but one of the first; toes fully webbed, that is to say, to the bases, or almost to the base of the disks; the tibio-tarsal joint of the adpressed hind limb reaches the end of the snout in the type (usually the eye, or between eye and nostril in all female paratypes). Skin smooth above and below except on the breast, belly, and thighs, where it is granular. One or two hardly distinguishable granules at the commissure of the mouth.

Variation in ♂ paratypes. The interorbital space is from one and a half to twice as broad as the upper eyelid; fingers only half webbed; tibio-tarsal articulation of the adpressed hind limb reaches to the eye, or slightly beyond. The skin of the gular disk is markedly granular.

Variation in young. It is highly probable that the young of more than one species of *Hyperolius* are included, and that some are young *puncticulatus*, but it is doubtful if they could be satisfactorily separated. They appear to be somewhat different to the young *puncticulatus* from Phillipshof in general, though individuals are similar. Fingers and toes of these young are much less webbed than those of the adults, the fingers exhibit a trace of web, and the toes might be said to be two-thirds webbed.

Colour of ♀ type in life. Above, uniform greyish-white on head, back, tibia, and outside edge of foot; a black speck on snout, nostrils ringed with black, edge of upper eyelid black, an indefinite broad cream-coloured stripe on side with a broad black one below it; thighs flesh-pink or blood-red. Below, lower lips tipped with blood-red, throat white, rest of the under surface blood-red.

Colour of ♀ paratypes in alcohol. The seven females exhibit a gradation from light to dark on the backs; two specimens (23 and 26 mm. long), which are very pale above and show no pink, have a light canthal band of the *argus* type, passing through the eye to some distance along the flank; there is a very slight concentration of black pigment above and below this colourless line. The remaining six (25 to 28 mm. in length and which are breeding females) do not show any light canthal band, but its place is taken by a dark spot around the nostril and another spot behind the eye, which exhibit a tendency to develop with age until they almost meet to form a very black canthal streak. There is also an isolated

broad black lateral band of a different character, being subdermal rather than superficial like the nasal spots. The colourless thighs and feet still show very pinkish in alcohol a year after being collected.

Colour of ♂ paratypes in alcohol. The smallest male (20 mm.), also pallid and without any pink on limbs, shows a light canthal band combined with heavy pigmentation around the nostrils, the pigmentation extending along the flank. The four remaining males (23 to 26 mm.) are like the adult females in having a dark ring round the nostrils which may unite with the black postocular spot to form a rich black canthal band. No. 13265 alone has a corresponding black, or sepia, spot on each elbow and knee, and a pair of them above the anal opening. The throat of the juvenile male is immaculate white; those of the others heavily speckled with black on the gular disk and usually, but not invariably, on the lips as well.

Colour of young. I made no field notes on the coloration of the young, but writing from memory, I think that in life they were a semi-transparent yellowish-green, yet dusky because of frequent minute black stippling. In alcohol they are rather colourless except for the abundant speckling; some show a light, dark-edged, canthal and lateral band of the *argus* type as well as a light dorsal stripe; others are puncticulate in addition.

Measurements.

Type ♀.	Snout to vent	28 mm.	Type ♀.	Diameter of orbit	3.5 mm.
	Length of head	10 "		Length of tibia	15 "
	Length of snout	4 "		Length of foot	21 "
	Breadth of head	9.5 "			

Length from snout to vent in the paratype females	28 to 23 mm.
Length from snout to vent in the paratype males	26 to 20 "
Length from snout to vent in the young	16 to 13 "

Breeding. Half-a-dozen of these young, taken on November 30th, 1926, have traces of tails, while one (No. 13275) has a tail 12 mm. long though the frog itself measures only 15 mm. from snout to vent.

Diet. Six stomachs examined, all of which were empty.

Habitat. The first frog was seen in silhouette as it squatted on the blade of a sedge at the edge of the mill-dam pond; thereafter many were found right down inside the central leaves and could be reached only by pulling these apart.

Hyperolius puncticulatus (Pfeffer)

Rappia puncticulata Pfeffer, 1893, Jahrb. Hamburg. Wiss. Anst., **10**, p. 99.

15 (M. C. Z. 13277–285) Derema, Usambara Mtns., 30. xi. 26.
33 (M. C. Z. 13286–295) Bumbuli, Usambara Mtns., 14. xii. 26.
14 (M. C. Z. 13296–305) Phillipshof, Usambara Mtns., 24. xii. 26.
44 juv (M. C. Z. 13306–310) Phillipshof, Usambara Mtns., 24. xii. 26.

Lunkelewa in Kisumbara.

Relations. While the Derema frogs are undoubtedly specifically identical with the Morogoro examples described and figured by Miss J. Procter [1] and those from Bumbuli seem to be variants of the same thing, the adult Phillipshof frogs appear to be somewhat intermediate with *argus*.

Coloration. The Derema frogs are well spotted above, except six of the smaller specimens; the very broad lateral band, bordered by a thick black line above and below, is a constant feature in the markings of the adult females in alcohol. *In life* one Derema specimen was coloured as follows. Above, brownish orange with or without black spots; a white line edged with yellow and broadly with black both above and below begins on snout, passes over (and the black line through) nostril and eye and terminates on flank. A corresponding white spot ringed with yellow and black on heel. Thighs and feet yellow, tinged with black. Below, uniformly yellow except hands and feet, which are flesh-pink.

Another was brownish-yellow above; a yellow line black-edged above and below, over (and through) nostril and eye to middle of flank; thighs and feet blood-red. Below, orange-yellow.

The Bumbuli series, all taken at one spot, exhibit the most bewildering amount of variation from a uniformly coloured frog whose only marking is a black ringed spot in front of the right eye (a rudiment of the canthal band which is present in most of the others), to individuals with all the exposed surfaces vermiculated, or with dorsal stripe and lateral markings. Scarcely two are identically marked. The following descriptions of two unusual types, as taken down in the field, are given in full.

No. 13286. An adult female taken eight feet from the ground in full view on the leaf of a banana. Outer fingers certainly one-third webbed, toes two-thirds webbed and nearly to the end of the outer toe. Tibio-tarsal articulation just touches posterior border of the eye. — *Colour in life.* Above, pale yellow so heavily stippled with minute black specks as to present a greyish-green ground colour; the lighter areas (lighter because almost free from stippling) are edged with black and take the form of spots more or less free or confluent; a pair of black $\wedge$-shaped lines follow the outline of the snout to the eye and may be more or less continued on flank or broken up into black-edged, light yellow spots (like the canthal bands and lateral stripes of *H. argus*); tibia and foot, and fingers also to a lesser degree, reddish-orange. Below, lemon-yellow; fingers, thighs and toes tinged with orange.

No. 13295. An adult female taken ten feet from the ground on the upper surface of a banana leaf. The outer toe is webbed to the disk, otherwise exactly

[1] Procter, 1920, Proc. Zoöl. Soc. London, p. 415, fig. 2.

similar to No. 13286 in the points cited above. — *Colour in life.* Above, pure white, a black line from the tip of the snout through the nostril and eye to two-thirds of the way along flank; a ∧-shaped mark on the snout corresponds with the outer lines but terminates before it reaches the eyes; supraocular region black, and an interrupted line, parallel with the lower one on flank, eventually joins with it; a pair of black, parallel, dorsal lines are connected anteriorly with the black supraocular lines by transverse ones but are open in the frontal region; these parallel lines unite just above the anus; at irregular intervals lateral transverse lines unite the dorsal with the flank lines; all of these black lines are tinged with lemon-yellow at their edges; hands, thighs and feet are reddish-orange. Below, lemon-yellow; fingers, thighs and toes tinged with orange.

The coloration of the young from Phillipshof is much the same as those of *H. mariae* from Derema, but the ∧-shaped mark and lateral lines are invariably present.

Measurements. The largest male (Phillipshof) measures 34 mm. (average of 14, nearly 29 mm.); the biggest female (Phillipshof) measures 39 mm. (average of 45, nearly 31 mm.). Arranged according to sex and locality they are as follows:

Range of	2 Derema males	25–29 mm.,	average 27 mm.
"	13 Derema females	22–33 "	30
"	10 Bumbuli males	26–31 "	28
"	23 Bumbuli females	28–36 "	32
"	2 Phillipshof males	31–34 "	32
"	12 Phillipshof females	25–39 "	31

Breeding. The ovaries of ten Bumbuli frogs examined on 14. xii. 26 were, with one exception, in a pepper-and-salt stage; ovules were fairly well advanced in the exception mentioned.

Whatever species the adult Phillipshof frogs are, it is almost certain that the young (mostly 14 mm. in length) belong to the same kind, as thorough search was made without revealing any other *Hyperoli* in the neighbourhood. These young were found in a swamp close to our camp. The vegetation, largely composed of floating tussocks of grass, was scattered everywhere upon the sudd. The only successful way to secure these frogs, discovered by Mrs. Loveridge, who captured most of them, was to part these tussocks, press them outwards and then wait. In a few moments one or two of these delicate, almost transparent, little creatures would come scrambling into view and clamber up one of the few grass-stems remaining vertical.

Diet. Thirteen Bumbuli frogs were examined and ten of these were found to contain insects as follows: (i) Two beetles (*Chrysomelidae* and *Cleridae* det. N. Banks). (ii) Two Cockchafer beetles. (iii) Beetles. (iv) Beetles. (v) Beetles.

(vi) Beetle. (vii) Beetle and orthopteran. (viii) Many small, black, spinose orthopterous legs. (ix) Earwig. (x) Two grasshoppers and a hemipteron.

Habitat. At Derema in the heart of sedges growing by a swamp. At Bumbuli these frogs were found between 3 and 6 P.M. sitting in hot sunshine on the upper or under surface of (cultivated) banana leaves, often in the gutter of the leaves; once one was taken on the outside of the unopened central tube, never one on the stem of the banana. We secured them by striking the leaf with a ten-foot wand, which caused the frog to take a flying leap into space and generally resulted in its landing on the ground. At Phillipshof in wild bananas on the forest edge; young (see above) in swamp half a mile from these bananas.

Hyperolius argus Peters

Hyperolius argus Peters, 1855, Arch. Naturg., part 1, p. 57.

68 (M. C. Z. 13322–33) Nyingwa, Uluguru Mtns., 15. x. 26.
Eggs (M. C. Z. 13334) Nyingwa, Uluguru Mtns., 19. x. 26.
1 (M. C. Z. 13335) Vituri, Uluguru Mtns., 29. x. 26.

Variation. Although this is undoubtedly what is generally called *argus*, the orbital diameter is only equal to the distance between the anterior border of the eye and the nostril. The snout is not, as Boulenger says (Cat. Batr. Sal. 1882, p. 122), 'as long as the orbital diameter.'

Four out of five frogs agree with the statement that 'the adpressed hind limb reaches the eye'; the chief exception appears to be in fully adult females, where it falls slightly short. In very young frogs as well as in adult males it usually reaches the eye; exceptions are three adult males where it passes, and two where it falls short of, the eye.

Coloration. These frogs differ markedly from that shown on the coloured plate XXII of Peters 'Reise nach Mossambique, 1882,' in having no red on the thighs and no yellow spots on the centre of the back, such spots being arranged in a lateral line on either flank. The evolution of these spots was well shown in the Nyingwa series as described below. It is to be noted that Boulenger (loc. cit. page 122) says 'thighs not colored.'

In life very young frogs up to 40 mm. in length are mainly white, above and below; the fingers and toes are orange; the back and exposed surfaces of the limbs are stippled with black specks which are denser in certain parts, thus forming lines; two of these lines, enclosing a more creamy-white region, run parallel from the tip of the snout to just above the anus, where they nearly meet the pair

from the opposite side; within the dorsal area so enclosed is another line from the supraocular region (where it touches the innermost of the outer pair) to the area just above the junction of the hind limb (where again it touches the inner line of the outer pair); another pair of lines enclosing a creamy stripe commences on frontal region and continue to just above the anus.

As the frog develops, the vertebral lines vanish and the lateral ones become definite black lines enclosing a bright yellow stripe, which, however, does not reach to the anal region but ends on the flanks and, undergoing a shortening process, tends to end above fore arms in fully adult individuals; during this disappearing process of the lateral lines, isolated yellow spots are sometimes left and parallel indistinct specks of dusky spots indicate exactly where the parallel lateral lines should be. Apart from these markings the coloration of the adult frog above is rich orange, beneath bright lemon-yellow.

Iris yellow speckled with black, pupil black and *round*.

Measurements. The largest male measured 34 mm., the biggest female 40 mm., the smallest frog, apparently a female, 20 mm.

Breeding. One ♀ deposited a lot of eggs on the banana leaf in which it was brought to camp, October 19th, 1926. These eggs appear to be perfectly spherical and are two-thirds white and one-third jet black. Captive specimens deposited many eggs during the last fortnight of October on the *outside* of the tin employed as a water dish.

Diet. Of sixteen specimens examined, ten held determinable remains; often fragments of more delicate insects were present in addition. The ten stomach contents were as follows: (i) Ant head and a grasshopper's limbs. (ii) Grasshopper's legs. (iii) Legs of a long, slender orthopteran, apparently an Acridian; also a cockroach. (iv) Cockroach. (v) Cockroach and its egg-purse. (vi) Cockroach and spider. (vii) Cockroach and caterpillar. (viii) Caterpillar. (ix) Caterpillar. (x) Beetle.

Habitat. These frogs were taken on domestic banana plants about 7,000 feet or somewhat lower. As a hundred were purchased from native children between October 15th and 19th they must be very plentiful. Doubtless more could have been obtained if remuneration had been continued. An attempt to ship thirty back to the Zoölogical Gardens failed. At Vituri they were also abundant; one was preserved for record and no attempt made to secure others as there were more interesting things to hunt for.

Hyperolius fulvovittatus Cope

Hyperolius fulvovittatus Cope, 1860, Proc. Acad. Nat. Sci. Phila., p. 517.

2 (M. C. Z. 13336–7) Nyango, Uluguru Mtns., 1. x. 26.
9 (M. C. Z. 13338–46) Tawa, Uluguru Mtns., 20. x. 26.
10 (M. C. Z. 13347–56) Dar es Salaam, 4. xi. 26.
17 (M. C. Z. 13357–60) Kizerui, Usambara Mtns., 8. xii. 26.

Remarks. A selection of these specimens was carefully compared by the junior author with the examples from Morogoro and Duthumi in the British Museum (Procter, Proc. Zoöl. Soc. 1920, p. 417) and found to be specifically identical.

Coloration in life. The colouring of the living frog was very different from that of alcoholic specimens as described by Cope and Miss Procter. The following notes were made in the field.

Nyange.....Above, a satiny pale greenish-yellow, two darker bands along either side of the spine from just above anus but converging to a point between the eyes, the whole of the upper surface sprinkled with minute brown speeks; another band on either side and still another on outer aspect of tibia. Below white.

Tawa.....Above, silvery white tinged with green, a darker greenish stripe from nostril through eye to flank and an almost parallel dorsal pair terminating, but *not* meeting, between eyes; exposed surfaces of thighs and foot darker than the rest; the whole of the upper surface covered with very minute black specks. Below, pure white without a trace of markings of any kind.

Dar es Salaam..Above, upper aspect of snout, back, arms and thighs silvery white, limbs heavily mottled with fawn-brown almost to exclusion of the white; a brown mark between eyes which terminates in two 'arms' posteriorly which frequently nearly meet two similar 'arms' projecting forwards from a brown spot above anus; these lines are almost absent in the adults; a dark lateral line from nostril to hind limb, where it connects with one of the forward-projecting posterior 'arms' already referred to.

The different aspect presented by these frogs is caused by a breaking down in the centre of the lateral lines; except for this feature, in alcohol they do not differ markedly from the Tawa frogs.

Kizerui.....In frogs from this locality the dorsal lines *do* meet between the eyes.

Measurements. Largest of three males (Dar es Salaam) 22 mm., average 20 mm. Largest of thirty-five females (Nyange) 26 mm., average 20 mm. Smallest frog, a female from Dar es Salaam, 15 mm.

Sex. The strange disproportion in the sexes (3 ♂ ♂, 35 ♀ ♀) may probably be accounted for by the males having some other habitat.

Breeding. Large ova are present in the Nyange (1. x. 26) and Dar es Salaam (4. xi. 26) frogs only.

Diet. Stomachs of ten specimens containing identifiable material held the following: (i) Beetle. (ii) Beetle. (iii) Water beetle. (iv) Scarab beetle. (v) Long-winged green beetle. (vi) Cercopid bug. (vii) Cercopid bug. (viii) Grasshopper. (ix) Spider. (x) Acacia leaves, doubtless accidentally introduced;

some were also present, with food, in the stomach of *M. uluguruensis* from Vituri.

Habitat. Nyange, Tawa, Kizerui, and some of the Dar es Salaam specimens were personally taken by the junior author inside the outer leaves of bananas, clinging to the main stem. The exceptions from Dar es Salaam were beneath the bark of some poles standing in a swamp; others were between layers of palm thatch of dilapidated huts in the same swamp which had been built as shelters for watchers of the rice crops.

Hyperolius flavoviridis Peters

Hyperolius flavoviridis Peters, 1855, Arch. Naturg., **21**, part 1, p. 57.

2 (M. C. Z. 13361–2) Dar es Salaam, 4. xi. 26.

Variation. The fourth toe in the male is longer than shown in the coloured plate (Reise nach Mossambique, xxii, figs. 4 and 5) and the snout is more acuminate. The only other difference appears to be that the tympanum is invisible in this specimen (hidden but discernible in type); otherwise both frogs agree very closely with Peters' description except for some minor differences of coloration.

Coloration in life. The green was a most vivid shade exactly corresponding to the colour of the new grass among which it was caught. Above, brilliant green, yellow on snout and limbs except on exposed surfaces of latter in repose, which are green; a somewhat indefinite brown line connects the nostril with the upper eyelid over which it passes; a light yellow lateral line commences at the eye and terminates on the flank; armpit and groin light blue, a trace of blue on the lower jaw, throat and limb joints.

Measurements. Length of male 29 mm. Length of female 19 mm. Peters gives the total length as 26 mm.

Habitat. Both were taken in a patch of fresh-grown grass on the northern end of Mogogoni swamp. The larger frog was secured only after a long chase, as it was so active.

Hyperolius microps Günther

Hyperolius microps Günther, 1864, Proc. Zoöl. Soc. London, p. 311, Pl. XXVII, fig. 3.

3 (M. C. Z. 13363–5) Dar es Salaam, 4 and 10. xi. 26.
2 (M. C. Z. 13366–7) Derema, Usambara Mtns., 30. xi. 26.

Variation, Sexual. They agree with Noble's key[1] in that the tibio-tarsal articulation of the adpressed hind limb extends beyond eye. It is to be noted, however,

[1] Noble, 1924, Bull. Am. Mus. Nat. Hist. **49**, Art. ii, p. 252.

that there is a strongly marked sexual dimorphism. Had it not been for the fact that a pair (13363 ♂ and 13365 ♀) were taken close together in the same thatch we should have hesitated to say they were specifically identical. In life, however, the similarities are more apparent. In the males (13363–64) the tibio-tarsal articulation reaches beyond, or far beyond, the end of the snout, while in the three females (13365–67) it reaches to the eye or nearly to the nostril.

Günther's type was a male with sharp canthus rostralis; in these males it is somewhat rounded and much sharper in the females. In the males (including type) the tympanum is hidden, but quite visible in the females, a very interesting sexual difference.

Apart from these trifling variations they agree well with the somewhat meagre descriptions.

The fingers are less than one-third webbed, the toes fully three-quarters webbed.

Coloration in life. Descriptions of three of these very beautiful little frogs were made in the field.

Male (No. 13363). Above, yellowish-green; limbs creamy white; a yellow line commences on snout between the nostrils and passes over eye and along the sides, more dorsal than lateral, to terminate just in front of junction of hind limb; in the supraocular region this line is interrupted by a dusky patch; a very few black and white flecks on back may be distinguished with the aid of a lens. Below, transparent whitish but discoloured by internal organs, which are clearly visible; the throat, which is tinged with blue, has also some white flecks.

Female (No. 13365). (Many eggs observable through abdominal skin.) Rich grass-green above; the line, yellow in male, is silver in female and hardly distinguishable in front of eye; its position is well indicated by deep black spots which are also found on the lateral line; the whole upper surface is speckled with minute black spots; limbs more greenish-yellow than in ♂. Below, greenish tinged with blue on the throat.

Female (No. 13366). (Eggs minute, not discernible through skin.) Above, olive-green; a light line, edged above and below with yellow, commences on snout, passes through and over nostril and eye, broadens on flank and then terminates abruptly in an obtuse point; a white, yellow-edged spot on each heel; thighs and tibia yellowish heavily speckled with olive, as is the outer aspect of foot to a less extent. Below, yellowish.

In alcohol all become pallid except for the distinct black naso-lateral line of specks and the fine dusky speckling of the females.

Measurements. Largest male 21 mm., the same as type; largest female 23 mm. Both Dar es Salaam. Derema females both 22 mm.

Breeding. The Dar es Salaam and one Derema frog held many large ova; these extend forward almost to the axilla on both sides of the body. The second Derema female may have recently deposited eggs, as the ovules were small.

Diet. Ants and flies in stomach of only specimen examined.

Distribution. Described from Rovuma Bay, the southern boundary of Tanganyika Territory, later recorded from Angola. The present is the first record known to us of its occurrence north of the Rovuma River. This minute species is rare in collections.

Habitat. At Dar es Salaam taken in the palm-leaf thatch of a collapsed and sodden hut in the Mogogoni swamp. At Derema in the sedges bordering the swamp above the saw-mills.

Megalixalus loveridgii Procter

Megalixalus loveridgii Procter, 1920, Proc. Zoöl. Soc. London, p. 418.

5 (M. C. Z. 13369–73) Nyange, Uluguru Mtns., 4–8. x. 26.
4 (M. C. Z. 13374–77) Tawa, Uluguru Mtns., 20. x. 26.
3 (M. C. Z. 13378–80) Mkarazi, Uluguru Mtns., 22. x. 26.
10 (M. C. Z. 13381–85) Vituri, Uluguru Mtns., 29. x. 26.
9 (M. C. Z. 13540–44) Dar es Salaam, 4–9. xi. 26.
151 (M. C. Z. 13545–55) Derema, Usambara Mtns., xi. 26.
14 (M. C. Z. 13556–60) Mt. Lutindi, Usambara Mtns., 10. xii. 26.

Distribution. This large series was collected in the hope of shedding some light on the very peculiar distribution attributed to members of the *fornasinii-leptosomus-loveridgii* group.

M. loveridgii was described by Miss Procter from a single female collected at Morogoro; therefore, the Vituri series is nearest to being topotypic. Later the junior author secured a male (M. C. Z. 10439) at Kilosa. Some living examples from Derema, presented to the London Zoölogical Society, are referred by Miss Procter to *loveridgii* as is also an example from Portuguese East Africa (Report of addition to the Menagerie, Zoöl. Soc. Lond., 1927, p. 9). Thus its distribution on the East Coast is almost coextensive with that of *fornasinii* and it occurs both to the north and south of the type locality of that species.

M. fornasinii. As far as Tanganyika Territory is concerned this species has been recorded from Zanzibar (Tornier, Boulenger, Müller and Böettger), Dar es Salaam (Tornier), Kingani (Pfeffer, Tornier), Unguu = Nguru? (Pfeffer, Tornier), Mhonda (Pfeffer, Tornier), Tanga (Tornier), and Ugogo. Lönnberg has reported it from Mombo at the foot of the Usambara Mountains. With the excep-

tion of Zanzibar, and Ugogo (now known as Dodoma District) these localities are well within an irregular square lying between Dar es Salaam, the Uluguru Mountains, the Usambara Mountains, and Tanga, or the area skirted by the present collecting trip. As *M. loveridgii* is a very distinct species it seems highly probable that these records should refer to the latter. If the Ugogo record is correct it would indicate an anomalous distribution comparable to that of *leptosomus* which, Noble has pointed out, occurs in rain-forest and savannah area.

Boettger has recorded as *M. fornasinii* var *unicolor* an example from Pemba lacking the vertebral line which Noble has already placed in the synonymy of the former.

M. leptosomus. A 'young one' has been recorded from Mavene in Usambara by Boettger, and other specimens from Zanzibar, Tanga and Undussuma by Tornier. It would be of great service if someone could reëxamine these specimens with a view to checking these identifications.

Nieden united *M. fornasinii* and *leptosomus* and recorded them from Pemba Island, Tanga, Bagamoyo, Ukami, Mohorro, Lindi, and Rugwe near Lake Rukwa.

Conclusion. At present the range of *M. loveridgii* appears to be East Africa from the Usambara Mountains (Barbour and Loveridge) and Kilosa (Loveridge) to the Zambesi (Procter). In all probability many records of *fornasinii* and *leptosomus* should be referred to this species.

Variation. The series shows remarkable uniformity in structural characters; none show the webbing of the hands as extensively as in the drawing of the type — one might rather say fingers half webbed. (In the Tawa series they are perhaps one-third to one-half webbed.) They are *much* more webbed than in examples of *fornasinii* from Cameroon and Gaboon; as also in a series of Congo specimens loaned by Dr. G. K. Noble for comparison.

One of the Nyange frogs was compared with the type *M. loveridgii*, with which it agreed in length and proportions; at the time the junior author noted that its feet were slightly more webbed than in *fornasinii*.

On the whole the toes are three-quarters webbed: to the base of the subterminal phalanx of the 4th toe, and to the disk on one side of the 2nd, 3rd and 5th.

The length of the third finger, which is uniformly twice the length of the first, does not appear to be a very helpful character in differentiating *loveridgii* from *fornasinii*, for the two Cameroon and Gaboon *fornasinii* available for comparison appear to be identical in this respect. The more spinose character of the minute tubercles in *loveridgii*, is the readiest means of differentiating the two species.

While in the description Miss Procter states, 'Length from snout to vent $3\frac{1}{2}$ times length of head,' in the table of measurements the length from snout to vent is given as 36 mm., and the length of head as 11 mm., i.e., between $3\frac{1}{4}$ and $3\frac{1}{3}$ times, so that this character again is of little use.

Peters gives the length of *fornasinii* as 35 mm., and the head length as 10 mm., so in size there is only a small difference. The Cameroon and Gaboon specimens show a head into body length of 2.5 and 3 times respectively.

In the small series of five females from Nyange the variation is from 2.7 to 3.18 times. It would appear as if the head is contained in body length in *loveridgii* 2.70 to 3.27 times and in *fornasinii* 2.50 to 3.50, the latter figures being based on the measurements of Peters' type and of the Cameroon, and Gaboon frogs.

The tibio-tarsal articulation exactly reaches the eye in every specimen, except in the case of two Derema females where it falls slightly short.

The tympanum is generally indistinguishable in males, more often present in females. On examining twenty specimens of each sex it was found present in about 10 per cent of the males and nearly 50 per cent of the females.

Coloration in alcohol. In no specimen of the present series does the vertebral band appear shaped as in the figure accompanying Miss Procter's description; there is a good deal of variation in its outline, but where present it more closely approximates to that shown in Bianconi's and Peters' plates of *fornasinii*.

In alcohol the ground colour is substantially as recorded by Miss Procter. As to the dorsal band an examination by locality shows the following.

Nyange.....All uniformly purplish brown above, without vertebral marking.
Tawa.....As above, but one with faint suggestion of the vertebral marking.
Mkarazi.....As in Nyange specimens, but one paler.
Vituri.....Six as in Nyange frogs; four show the vertebral marking and are noticeably paler.
Dar es Salaam..All except three show very pronounced vertebral stripe; two of these exceptions show it faintly, only one is without.
Mt. Lutindi.....Eleven without marking, three with vertebral stripe.
Derema.....58 males without marking, 40 with vertebral stripe; 31 females without marking, 26 with vertebral stripe.

It will thus be seen that this marking is more often absent than present in frogs from this region.

Coloration in life. It is probable that this frog changes its colour to a considerable extent.

Nyange..... ♀. Above, olive-brown on all exposed surfaces; scattered white spots chiefly on sides and limbs but also a few on back. Below, including hidden upper surface of thighs, lemon-yellow with the exception of the throat, chest, and belly, which are white.
Nyange..... ♀. Above, opaque silvery white in a shield-shaped patch extending from snout to vent, and side to side; similar patches cover the thighs and are, like the back, studded with black specks. Both were taken in bananas.

Dar es Salaam..Four silvery white examples, each with a fawn-brown vertebral line. Taken in holes in a post. Of another, taken in a banana close by, it was noted: back and tibia silvery white, a brown dorsal stripe terminating in point between eyes; flanks dusky, almost indicating a lateral stripe from snout to arms; below, pure white.

Measurements. Largest male 38 mm., smallest 31, average of a hundred males 33.71; largest female (Mkarazi and Derema) 38 mm., smallest (Tawa and Derema) 35 mm., average of a hundred females 35 mm.

Sex. In the first specimens collected the junior author was astonished at the disproportion of the sexes, viz. 2 males, 43 females. These were taken in bananas. At Derema, where the collecting was done in sedges, the balance was the opposite, viz. 98 males and 57 females. It is entirely a coincidence that the total should be 100 of each sex. The sexes may be readily told by the gular disk of the male, which is lacking in females.

Breeding. In the Uluguru Mountains these frogs did not appear to be breeding. Several Vituri specimens examined held only minute ova; in those from Dar es Salaam they were much larger; while each of ten females examined at Derema on 30. xi. 26 held a mass of developing eggs about 2 mm. in diameter.

Diet. Of the stomachs of ten specimens which were examined: (i) from Vituri held a large, hard lump almost the size of the stomach. This, when broken up, was found to be composed of frog's spawn. (ii) The largest meal had been made by a Derema frog which held a 20 mm. caterpillar, an 11 mm. grasshopper (head and abdomen measurement) and a 5 mm. spider. (iii) Spider. (iv) Spider and beetle. (v) Beetle. (vi) Two species of beetles. (vii) Coccinelid beetle. (viii) Ditto, same species. (ix) Beetle and the wings of a hymenopterous insect, almost certainly an ant. (x) Two small grasshoppers.

Parasites. Minute worms.

Habitat. The first examples from Nyange were taken by the junior author from between the outer skin and stem of wild banana plants growing in ravines at a high altitude. Others from Chogwe near Vituri (included in Vituri series), in domestic bananas. At Vituri, in wild bananas. At Dar es Salaam four were taken in the holes of a carpenter bee in the posts of an abandoned hut in Mogogoni swamp. The swamp was at one time planted with rice, hence the watcher's hut, long since abandoned. Over a hundred were taken in a single day in the sedges at Derema, usually between outer leaf and main stalk, but concealed from sight until the plant was stripped of the outer leaves. At Kizerui and Lutindi they were found in both domestic and wild bananas, in one instance in the central shoot so favoured by the bat (*Pipistrellus nanus*).

MEGALIXALUS ULUGURUENSIS sp. n.

Plate 3, fig. 2.

16 (M. C. Z. 13311–120) Vituri, Uluguru Mtns., 27–31. x. 26.
1 (M. C. Z. 13321) Bumbuli, Usambara Mtns., 14. xii. 26.
1 (M. C. Z. 13368) Derema, Usambara Mtns., xii. 26.

Type. No. 13311, Museum of Comparative Zoölogy. An adult female found sitting on a leaf of a fallen wild banana plant in a ravine at Vituri, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge on October 27th, 1926.

Paratypes. As listed above.

Relations. This very Hyperolius-like frog would have been placed in that genus had not the pupil been observed to be vertical in life. In the second specimen taken it was round. Under chloroform the round pupil became a narrow vertical slit, but during preservation reverted to the round shape. Its nearest relative appears to be *M. madagascariensis*, which has the same white skin and canthal stripe but whose males have a gular disk.

Description. Head slightly broader than long; snout obtusely rounded or slightly truncated, slightly projecting, longer than the orbital diameter (reckoning snout from the anterior border of eye); canthus rostralis distinct but rounded; loreal region almost vertical, very slightly concave (in young rounded and not concave); interorbital space one and a half times as broad as upper eyelid; transverse orbital diameter equals the distance from the anterior border of the eye to the nostril (slightly longer in some paratypes), also the distance between the nasal openings; tympanum hidden (absolutely in every specimen). Fingers and toes moderate, dilated at their tips; fingers about one-third (certainly less than half) webbed; toes fully webbed, that is to say, to the bases of all the disks, though in the case of the fourth toe this is achieved only by a narrow border of web from the sub terminal joint (unfortunately this delicate, narrow, semi-transparent webbing has not been reproduced well in the accompanying figure); the tibio-tarsal joint of the adpressed hind limb reaches the eye in the type and in all paratypes. Skin smooth above and below, except on the belly and thighs, where it is granular, hardly perceptibly so on the thighs; some scarcely distinguishable granules at the commissure of the mouth.

Color of ♀ type in life. Above, head, back and exposed surfaces of fore and hind limbs enamel-white; a pair of black-speckled, reddish-brown flecks on anterior part of back; another pair, more dorso-laterally situated, just in front of junction of hind limbs, and a streak of similar color on each tibia; commencing on snout a black-speckled, reddish-brown network line (the interspaces being

enamel-white) passes through nostril and eye and terminates on flank. It will be noticed that when the hind limbs are arranged in the normal attitude of rest, the tibial streaks form a continuation of the lateral network lines; fingers, thighs and part of feet yellow. Below, transparent yellow except for a broad belt of enamel-white across chest.

The whole Vituri series agreed with above description except for very minor differences. Some have a third pair of spots between eyes.

Colour in Alcohol. These spots appear brown in alcohol, while the enamel-white entirely disappears, the frog being flesh-coloured with minute speckes, which may be so numerous dorsally as to give a distinctly brownish appearance to the upper surface.

Colour of Bumbuli paratype in life. The Bumbuli frog, while structurally agreeing with the Vituri series and having the same appearance in alcohol, differed considerably when alive. The colouring noted in the field was as follows. Above on head, back, fore arms, tibia and edge of feet, white with patches appearing slightly rubbed and showing yellowish-green; black speeks are scattered over the whole of the upper surface, including upper arm and thigh, which are yellowish; a more or less transparent, slightly greenish band from snout through nostril and eye to flank shows the black stippling more clearly; fingers and toes clear lemon-yellow. Below, transparent white, more opaque on limbs than on belly, where internal organs show through; fingers and toes lemon-yellow.

Measurements.

Type ♀.	Snout to vent.....	31 mm.		Diameter of orbit ...	3 mm.
	Length of head.....	9 "		Length of tibia	14 "
	Length of snout	4.5"		Length of foot.....	19.5"
	Breadth of head.....	10 "			

Largest specimen (13314) also a female 32 mm.; next four, after type, 29 mm. each. The half-dozen smallest frogs are 24–25 mm. and apparently males.

Sex. It seems highly improbable that all sixteen frogs are females. If, as we suppose, the smaller are males (and one examined proved to be so), then these males are without a gular disk.

Breeding. The adult females, including the type, hold numerous well-developed eggs, visible in life through the transparent abdominal skin.

Diet. Besides much smaller, fragmentary insect remains, the following were discernible in ten stomachs examined. (i) Large muscoid dipteron. (ii) Many fruit flies (Drosophila), one adult cercopid homopteron, and several nymphal ones. (iii) Large cercopid of a different species. (iv) Cercopid bug. (v) Elater beetles. (vi) Beetle (? Lathrididae). (vii) Two chrysomelid beetles. (viii) Several

beetles with long elytra. (ix) Beetle, bug and grasshopper. (x) Earwig, ant and a small neuropteran which Mr. N. Banks considers is almost certainly *Myrmelon sp.*

Habitat. All the Vituri specimens were taken on wild bananas in the rain-forest at an altitude a little over 2,000 feet; the type at noonday was fully exposed. The Bumbuli frog was found at 9 A.M. sitting on a wild banana leaf about nine feet from the ground. The plant was growing on the edge of the patch of remaining (dry) primary forest above the Mission, which is about 2,000 feet.

Parasites. A nematode in one of the Vituri frogs.

Leptopelis aubryi (A. Duméril)

Hyla aubryi A. Duméril, 1856, Rev. Mag. Zoöl. (2), 8, p. 561.

11 (M. C. Z. 13561–71) Mt. Lutindi, Usambara Mtns., 10. xii. 26.

Variation. The tympana of the two adults are approximately three-quarters and seven-eighths of the eye diameter instead of 'half' as given by Boulenger (Cat. Batr. Sal., 1882, p. 135); in other respects they agree with the description.

In the nine young the tympanum is entirely wanting.

Coloration in life. A very beautiful pale green.

Measurements. The two adult females measure 58 and 52 mm. respectively; the young, 11 mm.

Breeding. Neither of the adults was in breeding condition, the ovaries being shrunken and holding minute ova. Nine of the young were found one morning sitting on the upper surfaces of the leaves of a single banana plant within fifty feet of where the adults were taken.

Diet. (i) A woodlouse, a 25 mm. reduviid bug, a 16 mm. cercopid bug, together with the head and limbs of a large grasshopper. (ii) A brown cricket.

Distribution. This Cameroon species has already been recorded by Nieden from Amani.

Habitat. Both adults were taken concealed in the central shoots of domestic bananas growing wild in the forest on the lower slopes of Mt. Lutindi. Special search failed to reveal any others except the young.

Leptopelis rufus Reichenow

Leptopelis rufus Reichenow, 1874, Arch. Naturg., **40**, part 1, Pl. IX, Figs 1a and 1b.

12 (M. C. Z. 13572–78) Bagilo, Uluguru Mtns., 9–30. ix. 26.
8 (M. C. Z. 13579–85) Vituri, Uluguru Mtns., 27–30. x. 26.

Variation. The size of the tympanum in relation to the diameter of the eye varies a good deal; it is more often half than three-fourths the orbital diameter.

Coloration in life. In colouring, East African *rufus* differ from topotypic Cameroon specimens as already remarked (Loveridge, Proc. Zoöl. Soc., 1925, p. 787). The four following types were all taken at Bagilo.

♀. 70 mm. Rich olive-green; a conspicuous, 11 mm. long, black, yellow-edged 'query' mark on head and nape; two or three more irregular blotches on back; four black cross-bars on tibia, and three or four, more or less distinct, on the hind feet; similar cross-bars on fore arms; disks of fingers and toes bright yellow; lower surfaces white but so heavily stippled with green as almost to obscure the white. Eyes red.

Another adult ♀, 67 mm. in length, has a broad red band commencing on the snout and passing over the eye and along the sides till it terminates just before the hind limbs; the anus is ringed round by a similar red band. This seems to be the most common type, as eight of our twelve females possess this lateral band.

♂. 53 mm. Slightly reddish-green without markings on crown or back. A black band, edged above with a bright-yellow line, passes from the snout through nostril and eye to disappear just in front of the hind limb, where it is broken up by yellowish-white vermiculations. One or two faint indications of possible black bars on the limbs; a black circle, edged above with yellowish-white, around anus; upper lip more or less edged with yellow, with a streak nearly running up to the anterior border of the eye. Below, white, less stippled with green than in the ♀.

Another apparently immature ♂ has a broad black, yellow-edged bar connecting the upper eyelids, while there is a similar yellow-edged, black, ∧-shaped marking on the back between the fore arms.

Yet another presumably juvenile ♂ has a narrow bar like the last, but the ∧-shaped marking is replaced by an almost round black spot, and the whole of the back is vermiculated with dark lines.

Measurements. The largest male (Vituri) measured 46 mm., range being 34 to 46 mm., with an average of 40 mm.; the sexing of the smallest being somewhat doubtful. Largest females (Bagilo and Vituri) 70 mm., range 54 to 70, with an average of 63.5 mm. All adult and breeding.

Sexes. At Bagilo one male and seven females were taken; at Vituri, seven males and five females.

Breeding. All the Bagilo females held developing eggs (9–30. ix. 26) but those in the Vituri frogs are much larger (27–30. x. 26), some being as much as 4 mm. in diameter.

Diet. (i) Beetle. (ii) Beetle, spider, grasshopper. (iii) Grasshopper legs. (iv) Many grasshopper remains. (v) Grasshopper. (vi) Grasshopper. (vii) Grasshopper. (viii) Large, wingless, yellow grasshopper of a species common in the bananas. (ix) Orthopteran legs and a cockroach. (x) Two big cockroaches. (xi) Earwig.

Habitat. Taken in the wild bananas growing in moist ravines in the rain-forest.

LEPTOPELIS ULUGURUENSIS sp. n.

Plate 3, Fig. 3.

1 (M. C. Z. 13586), Nyange, Uluguru Mtns., 5. x. 26.
21 (M. C. Z. 13587–96), Vituri, Uluguru Mtns., 27–30. x. 26.

Type. No. 13586, Museum of Comparative Zoölogy. An adult male taken on a wild banana plant at Nyange, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge on October 5th, 1926.

Paratypes. Twenty-one specimens from Vituri near Nyange as listed above.

Relations. These frogs have the undivided omosternum and bony metasternum as described by Noble for the genus *Leptopelis*.

In keys it usually falls near *rufus* but is much squatter in habit, with shorter snout, shorter hind limbs, and a less distinct, or entirely concealed, tympanum, in addition to the very different coloration. Compared with many species at the British Museum.

Description. Vomerine teeth in two juxtaposed groups between the choanae. Head broader than long; distance between the nostrils equals distance between a nostril and the anterior border of orbit, two-thirds the longitudinal diameter of the eye; canthus rostralis short and distinct, loreal region concave; tympanum visible on right side of head, concealed on left (indistinguishable in ten paratypes), one-quarter the longitudinal diameter of the eye opening. Inner finger scarcely webbed, outer one, one-third webbed, disks well developed. Toes webbed to the disks on the inner side of second, third, and fifth; only as a not very distinct seam to the disk of the fourth; first toe half webbed. The extent of this webbing has not been reproduced so fully in the accompanying figure as in the original drawing. A moderate, slightly compressed, inner metatarsal tubercle. The tibio-tarsal articulation of the adpressed hind limb just falls short of the eye (reaches eye in many paratypes but never beyond). Skin shagreened above, very granular beneath except on tibia and sole of foot.

Colour of ♂ type in life. Above, rich green, upper eyelids brownish, their outside edge yellow; seven orange spots irregularly dispersed on back; thighs trans-

parent yellowish, each with an orange spot; lower arms the same but so liberally besprinkled with minute brown specks as to appear brownish. Below, throat blue, rest of the under surfaces white, more or less tinged with blue, particularly at axil and groin. Iris white, speckled with black; pupil black.

Of a ♀ paratype from Vituri it was noted: colour as in type but back greenish-brown; a very few yellow spots on the flanks.

Colour of ♂ type in alcohol. Above, head purplish-brown shading to fawn on back, the spots yellowish-green, limbs fawn, thighs almost colourless. Below, white.

Measurements.

Type ♂.	Snout to vent.....	42 mm.	Diameter of orbit....	6 mm.
	Length of head.....	15 "	Length of tibia.....	19 "
	Length of snout.....	6 "	Length of foot.....	30 "
	Breadth of head.....	17.5"		

The type is probably the largest male taken; largest female 59 mm.; smallest frog 28 mm., taken 28. x. 26.

Breeding. All the females examined had well-developing ovules about 2 mm. in diameter, 27–30. x. 26. In life these eggs could be observed through the fairly transparent abdominal skin.

Diet. (i) Spider. (ii) Spider. (iii) Earwig and grasshopper. (iv) Pallid acridian. An interesting feature of the stomachs of all six specimens examined was the presence of acacia leaf petals in each one; in two there was nothing else; one held over thirty. These petals are continually twinkling down from the trees into the bananas where the frogs live, and form large drifts in the leaves. At first the collector was inclined to suppose that they were accidentally taken up with food, but it seems possible that some frogs may be foolish enough to snap them up in mistake for insects as they alight on the large flat leaves of the bananas.

Enemies. One of these frogs was recovered from the stomach of a snake (*Crotaphopeltis hotamboeia tornieri*) at Vituri.

Habitat. The type was found sitting in the gutter-like stalk of one of the immense top leaves of a wild banana. It made no attempt to escape other than to squat back into its retreat. The Vituri series were all taken in wild or domestic bananas.

Leptopelis parkeri sp. n.

Plate 4, Figs. 9 and 10.

1 (M. C. Z. 13597) Vituri, Uluguru Mtns., 27. x. 26.

Type. No. 13597, Museum of Comparative Zoölogy. An adult female taken on a domestic banana plant at Vituri, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 27th, 1926.

Diagnosis. Near *L. uluguruensis*, from which it is distinguished by its well-separated vomerine teeth, its longer hind limbs, smooth dorsal skin and colouring. Undivided omosternum and bony metasternum.

Description. Vomerine teeth in two *well-separated* groups between the choanae. Head broader than long; distance between the nostrils *slightly shorter* than the distance between a nostril and the anterior border of orbit, rather more than two-thirds the longitudinal diameter of the eye; canthus rostralis distinct, loreal region concave; tympanum just distinguishable on both sides of head (possibly an individual character), *one-third* the longitudinal diameter of eye opening. Inner finger barely webbed, outer one one-third webbed, disks well developed. Toes webbed to the disks on the inner side of the second, third, and fifth; only as a not very distinct seam to the disk of the fourth; first toe half webbed. A small, thinly compressed, inner metatarsal tubercle (considerably different in appearance to that of *L. uluguruensis*). The tibio-tarsal articulation of the adpressed hind limb *reaches the nostril.* Skin *smooth* above, granular beneath except on tibia and sole of foot; the granulations of the throat noticeable only on close inspection.

Colour of ♀ type in alcohol. Above, fawn with very irregular stipples and dashes of dark rufous-brown on the back, besides several light spots; a line of stippling connecting the upper eyelids; loreal region to tympanum and along flanks mottled with white and brown, as are also the fore limbs with four cross-bars on the fore arm formed by a concentration of the mottling; on the tibia also are four cross-bars indicated in a similar manner; the upper aspects of thighs and feet mottled like the flanks. Below, immaculate white except for a little mottling on the extreme edges of the lower jaw.

Unfortunately, though in the field a note was made as to this being an undescribed species, pressure of other work prevented colour notes being made as to its appearance in life, which was very different from that of *L. uluguruensis.*

Measurements.

Type ♀.	Snout to vent.....	45 mm.		Diameter of orbit....	5 mm.
	Length of head.....	17 "		Length of tibia.....	22 "
	Length of snout.....	7 "		Length of foot.....	32 "
	Breadth of head.....	16 "			

Breeding. Ovules small, ovaries contracted.

Diet. Remains of what are apparently orthopteran limbs were found in the intestine, together with numerous leaf petals like those found in *L. uluguruensis.* The stomach was empty except for two of these petals.

Named after Mr. H. W. Parker of the British Museum, who has so kindly assisted these investigations by making comparisons with types in his care, and in many other ways.

Leptopelis vermiculatus (Boulenger)

Hylambates vermiculatus Boulenger, 1909, Ann. Mag. Nat. Hist., (8) **4**, p. 497. Nieden, 1910, Sitzber. Ges. Naturf. Freunde, Berlin, p. 448. Nieden, 1915, Mitt. Zoöl. Mus. Berlin, vii, p. 370.

1 (M. C. Z. 13598) Amani, Usambara Mtns., xii. 26.

Relations. Nieden has pointed out that Tornier's Plate V, fig. 1 (Tornier, 1897, Kriechthiere Deutsche-Ost-Afrikas), of *H. aubryi* really represents *vermiculatus* and that the accompanying text refers to both frogs, under the impression that *vermiculatus* was the young of *aubryi*. Nieden himself considers it more closely related to *L. rufus*. Our examination of the unforked omosternum confirms this view and places the species in the genus *Leptopelis*.

Variations. While in London on the way back from Tanganyika Territory the junior author reëxamined the 34 mm. type and closely compared it with the 46 mm. specimen listed above. Some points in the original description which had puzzled him in the field were resolved as follows. The quotations are from the original description.

'Snout rounded, as long as the eye,' means from the anterior border of the eye to the end of the snout.

'tympanum . . . two-thirds diameter of eye' in the type was found almost to equal the diameter of eye in our specimen.

'fingers with a mere rudiment of web' is most misleading, for the development is the same in both specimens, whose fingers are at least one-third webbed; the least webbed is the third finger, with two free joints, apart from the disk, on its inner side.

'toes half-webbed.' In the type the webbing on the third and fifth actually does not reach to the end as in our specimen.

'inner metatarsal tubercle rather small, oval, feebly prominent.' This tubercle in the larger frog measures 2 mm. in length and may be said to be well developed.

'the tibio-tarsal articulation reaches just in front of the eye.' In ours it reaches only to the posterior border of the eye. The type, however, is somewhat macerated, which may account for this difference.

Measurements. Total length 34 mm.

Sex. ♂.

Diet. Stomach empty; intestine held what were apparently remains of termites.

Distribution. The type, which is still the only example in the British Museum, came from Amani. Apart from these the only other examples known to us are

recorded by Tornier and Nieden from Amani, Derema, Bulwa (Buloa) and 'near Tanga or Magrotto.' Nieden also lists two young examples from Uhehe. If these latter are correctly determined *L. vermiculatus* should occur in the Nguru and Uluguru Mountains, which form connecting links between the Usambara and the mountains of the Uhehe district.

Habitat. No frog gave us more trouble to locate than this species. Krefft recorded it as found on bushes in the evening after rain. Search was made at Derema as well as at Amani but without result. On departing from Amani we left a native behind to endeavour to secure three topotypic species which we still lacked. I had pointed out to him the only remaining wild banana plant anywhere near Amani (already examined by Salimu, who found only *Megalixalus* and *Hyperolius* in it). It was growing on the precipitous side of a ravine near the summit of Mt. Bomoli. Abedi was urged to reëxamine this banana and the special offer of a shilling (25 cents U. S. currency) was made if he got the right frog.

Two days before we were due to sail from Tanga, the native, Abedi, arrived with his frog and an example of *Atheris ceratophorus*, one of the other two species we lacked!

Leptopelis johnstoni (Boulenger)

Hylambates johnstoni Boulenger, 1897, Proc. Zoöl. Soc., London, p. 803, pl. xlvi, fig. 4.

4 (M. C. Z. 13599–602) Bagilo, Uluguru Mtns., 14. ix. 26.

Relations. These frogs have the unforked omosternum of the genus *Leptopelis*.

Variation. The tibio-tarsal articulation, which reached the eye in the type and in three of the present series (♂, ♂, ♀), falls short in one ♀, only reaching the large and prominent tympanum.

Coloration in life. ♂. 48 mm. Above, pale brown; a very pronounced chocolate-brown, triangular-shaped marking occupying the centre of the back, its apex reaching the occiput; a transverse bar of the same colour uniting the eyelids, a broad band of the same colour from snout through nostril and eye to midway between fore and hind limbs; two indistinct bars of same colour on fore arm, three very distinct ones on tibia; all lower surfaces white, more or less marbled with pale grey.

The striking dorsal marking terminates in a sharp point anteriorly and is unlike the type in this respect; the white tarsal lines shown in the figure of the type are lacking in all the Bagilo frogs; the cross-bars on the limbs which Boulenger

mentions as indistinct are very pronounced on the males, but lacking in the females. There is a striking similarity between the colour pattern of this species and that of *L. bocagii*.

Measurements. The males both measure 48 mm., the larger female 49 mm. The type was 42 mm.

Breeding. Ovaries contracted, not breeding in September.

Diet. Remains of grasshoppers in two of these frogs.

Distribution. This species has already been recorded from Mombo at the foot of the Usambara Mountains by Lönnberg, probably the most northerly record for the species which, originally described from Nyasaland, has since been recorded from the Transvaal.

Habitat. All four frogs were taken on a recently hoed native clearing on the mountain side, but quite close to a patch of rain-forest.

Hylambates maculatus A. Duméril

Hylambates maculatus A. Duméril, 1853, Ann. Sci. Nat., (3) **19**, p. 165, Pl. VII, figs. 1–1b and 4. (Type locality, Zanzibar.)

Hylambates argenteus Pfeffer, 1893 (1892), Jahrb. Hamburg. Wiss. Anst., **10**, pt. 1, p. 100, Pl. II, fig. 3. (Type locality, marsh south of Bagamoyo, T. T.)

12 (M. C. Z. 13603–10) Dar es Salaam, 4. xi. 26.

Variation. Unfortunately the type of *H. argenteus* is lost (fide Nieden, 1915), but a careful comparison of the description with topotypes of *H. maculatus*, as well as with the description of that species, shows beyond reasonable doubt that it was based on a variant in which the chain of vertebral spots had coalesced to form a dorsal line. In the series before us various stages of such linking up are represented. On geographical grounds one would expect these frogs to be identical. Zanzibar is thirty miles off shore from Bagamoyo. The marsh at Dar es Salaam, where this series was obtained, is thirty miles south of Bagamoyo, so that the specimens are not far from being topotypic of *H. argenteus;* indeed the silvery colouring is so striking in life that the junior author reported having taken *argenteus*. The only structural point of difference in the translated descriptions is 'toes half webbed' for *maculatus* and 'toes only webbed at base' for *argenteus*, which, in the less discriminating days when it was described, might well be intended for the same thing. The series is remarkably uniform; in no specimen does the tibio-tarsal articulation vary but, like the type, reaches to the tympanum when the hind limb is adpressed. Compared with the series of *maculatus* in the British Museum and topotypes in the Museum of Comparative Zoölogy.

Coloration in life. This is one of the most handsome frogs in East Africa, a fact one would never glean from the original description of a preserved specimen from Zanzibar.

Above, silvery grey with numerous silver-edged, brown blotches of very irregular shape; on the fore and hind limbs these blotches take the shape of irregular bands, of which there are four on the anterior and ten on the posterior limb; the groin and posterior aspect of thigh are scarlet except for the brown blotches, which lose their silver edging when they impinge on the scarlet. Below, white, studded with minute grey specks; armpits red; lower surface of arms tinged with orange.

Measurements. Larger of two males is 57 mm., the largest female 55 mm.; the series of ten females ranges from 37 to 55 mm.

Sex. The sex is readily distinguished by the adhesive disk on the throat of the male, flanked by subgular vocal sacs.

Breeding. A few eggs in each ovary are in the 'pepper and salt' stage, the larger measuring 1.5 mm. in diameter.

Diet. Grasshoppers were recovered from the stomachs of two frogs.

Defence. Their smooth skins are very sticky in life.

Parasites. Oxyuroid worms were found in one of the two specimens examined.

Habitat. All were taken in the vicinity of Mogogoni Swamp. I captured the first beneath a heap of grass hoed from the swamp, a second beneath a palm leaf lying on the ground in an abandoned hut, and three others between the layers of palm-leaf thatch of a watcher's hut in the swamp.

BREVICIPITIDAE

Callulina kreffti Nieden

Callulina kreffti Nieden, 1910, Sitzber, Ges. Naturf. Freunde, Berlin, p. 449.

6 (M. C. Z. 13611–16) Bagilo, Uluguru Mtns., 15–21. ix. 26.
18 (M. C. Z. 13617–22) Vituri, Uluguru Mtns., x. 26.
20 (M. C. Z. 13623–27) Amani, Usambara Mtns., xi. 26.
4 (M. C. Z. 13628–31) Kizerui, Usambara Mtns., S. xii. 26.
4 (M. C. Z. 13632–35) Phillipshof, Usambara Mtns., xii. 26.

It also occurs at Chogwe, Uluguru Mountains and Mt. Lutindi in the Usambara Range.

Variation. The interorbital space, said to be about 1½ times as broad as the upper eyelid in the type, is a character which varies with age. While it is 1½ times in adult toads, the interorbital space equals the breadth of the upper eyelid in small specimens. The tibio-tarsal articulation, supposed to reach half-way between

the armpit and the eye, does not reach beyond the armpit in any specimen, while in small examples it extends only midway along the flank! While the first finger at times is equal to only half the length of the second, particularly in small toads, in large frogs the first extends as far as the base of the terminal phalanx of the second; in the Kizerui toads this is the case with every specimen.

Coloration in life. Above, grey-brown mottled with darker and lighter. Many have a typically *Breviceps* marking in the shape of a light, slightly pinkish bar from below the eye to the angle of the mouth.

Measurements. Largest ♀ (Bagilo) 47 mm., (Amani & Kizerui) 45 mm., (Phillipshof) 44 mm., (Vituri) 41 mm. Without dissecting the whole series it is impossible to say which is the largest male; they appear to be about half the size of the females. The smallest toads (10 mm.) were taken in a wild banana at Amani on 25. xi. 26.

Sex. The ♂ inflates the throat to a considerable extent. One specimen (M. C. Z. 13617) is preserved with the throat so inflated.

Breeding. The Bagilo, Vituri, and Phillipshof females examined had only small ovules; those from Amani and Kizerui held large ova 3 mm. in diameter.

Diet. (i) Millipede and beetles. (ii) Millipede and beetles. (iii) Beetles and ants. (iv) Beetles and ants. (v) Beetle and cockroach. (vi) Cockroach. Beetle legs and *Gasteracantha* spider. (vii) Ant. (viii) Large *Camponotus* ant. Both these last stomachs contained much hard matter, but nothing approaching a termite could be recognized.

Defence. A gummy exudation from dermal glands.

Enemies. On three occasions these toads were recovered from the stomachs of *Crotaphopeltis hotamboeia tornieri*, twice at Amani, once at Mt. Lutindi.

Distribution. Originally described from Amani and Tanga; we believe the above records are the first extension of its range westward to the Western Usambaras and southward to the Uluguru Mountains.

Habitat. In the Usambara Mountains they are usually found in the cultivated bananas in damp situations, or in those growing on the outskirts of the forest; not infrequently found in or beneath rotting logs.

In the Uluguru Mountains it was invariably associated with the wild banana plants, found either (1) among the collection of moist and rotting leaves collected in the upper fronds, (2) between leaf and stem, or (3) among débris at the base of the plant.

Phrynomerus bifasciata (Smith)

Brachymerus bifasciata Smith, 1849, 'Illus. Zoöl. S. Africa,' **3**, Pl. LXIII.

6 (M. C. Z. 13636–40) Dar es Salaam, 4. xi. 26.

Defence. An interesting instance of what I believe to be poisoning by this species occurred. For some time I had had my hands in water catching frogs, so that they were thoroughly soaked when I took the first *P. bifasciata* in my left hand. It rested there as I examined and admired its handsome aposematic colouring; once or twice I momentarily closed my hand upon it when it showed signs of attempting to escape; a few minutes later it was consigned to a bag. Half an hour later my fingers and the palm of my hand, principally at the sides, were itching as from a nettle sting. Presently I noticed the fingers were swollen, almost imperceptibly to the eye, but sufficiently to render them uncomfortable and the closing of the hand difficult. All symptoms of poisoning had subsided three hours later.

I might add that I have handled these frogs in previous years without any such effects. Salimu also said that he had never felt anything after handling them. On his own account he purposely rubbed the tip of a finger (which like mine had been immersed for some time) on the back of a frog and then observed the urticating results. During the half-hour that elapsed between my handling the frog and before the commencement of the irritation I do not think I touched or brushed against anything that could possibly have produced the symptoms.

Habitat. These frogs were taken under the sheath-leaf of the stem of a banana plant, or plants, growing on, or near, the banks of irrigation ditches at the Roman Catholic Mission some few miles from Dar es Salaam.

Spelaeophryne methneri Ahl.

Plate 2, Fig. 6.

Spelaeophryne methneri Ahl, 1924, Sond. Zoöl. Anz. Akad. Verhl., **61**, p. 99.

10 (M. C. Z. 13641–45) Nyange, Uluguru Mtns., 2–11. x. 26.
1 (M. C. Z. 13646) Mkarazi, Uluguru Mtns., 22. x. 26.

Relations. On securing these frogs the collector endeavoured to identify them with the genus *Spelaeophryne*, but the differences were so marked that it seemed impossible. Later the authors jointly came to the same conclusion and were on the point of describing the specimens as types of a new genus, when Dr. G. K. Noble, who had examined and made notes on the type of *Spelaeophryne methneri*, informed us that they are undoubtedly specifically identical and that Ahl was mistaken in saying 'Pupil round. Tongue nicked behind. Sacral not very strongly dilated.' He also omitted to mention the small cartilaginous omosternum.

We had already prepared a generic description, to which Dr. Noble would add, 'No intercalary, coccyx with two condyles, procoracoid present'; and he considers 'the genus closely allied to *Breviceps*, but differing from that genus in its palate (the folds of which are unique among the Salientia), its coccyx, and less robust form.'

Pupil horizontal. Tongue large, pyriform, free, not notched behind; palate toothless with transverse dermal ridge posteriorly. Maxilla toothless. Tympanum present. Fingers and toes free, short, thick, with undilated tips. Outer metatarsals united. Bony clavicles; cartilaginous omosternum; coracoids broad and well developed, bony; sternum larger than in *Breviceps uluguruensis*. Diapophyses of sacral vertebra very strongly dilated. Terminal phalanges simple.

Variation. The description of the figured specimen, a male (M. C. Z. No. 13641), is as follows. Habit rather stout, very similar to that of *Phrynomerus*, from which it differs in the form of its limbs, coloration, and in possessing a thick gummy excretion which is probably unique among amphibia in that it is more tenacious than the upper layers of derm. Head small, obtusely truncated; nostril at tip of snout; snout (as from anterior border of eye) much longer than the orbital diameter; interorbital space twice to thrice the breadth of the upper eyelid; tympanum distinct, vertically roundish, its diameter equal to that of the orbit. Fingers rather short, first very slightly shorter than the second; toes short, no terminal disks; subarticular tubercles very distinct; well-developed, but low, inner and outer metatarsal tubercles. Hind limb very short, and excessively thick; the tip of the longest toe of the adpressed hind limb just reaches the eye (or fore arm in many of the paratypes). An attempt to adpress the hind limb generally results in rupturing the skin.

Skin pitted, rugose, granular or smooth, according to preservation; usually an indistinct fold from the eye to the shoulder. Male with a subgular vocal sac.

Coloration in life. Above, jet black; a bright scarlet ∧ -shaped band, following the outline of the snout from behind and above the tympanum, passes close above the eyes. Below, edges of jaw black, rest of lower surface brownish.

Measurements of figured ♂.

Length of head and body	52 mm.	Length of tibia	14 mm.
Length of head	11 "	Length of foot	19 "
Breadth of head	15 "	Length of 4th toe	8 "
Diameter of orbit	3 "		

The four largest males and females all measure 52 to 53 mm. from snout to vent; the two juveniles, 32 mm. (Nyange) and 27 mm. (Mkarazi).

Diet. The enormous stomach of the only specimen examined was stuffed with termites, mostly big-jawed warriors.

Defence. If wrapped in leaves, a linen bag (unless this is wringing wet) or anything with a dry surface, the dermal secretions, owing to their extreme stickiness, cause the upper layers of the toad's slug-like skin to come off in great patches, leaving the white tissue exposed.

Habitat. Four were obtained from beneath the rotting grass thatch of a collapsed native hut (two were taken the same day, and from beneath the same hut, as was *Typhlops uluguruensis* sp. n.). One was under a heap of grass and weeds in a native plot. Two small ones under damp logs in the dry forest a hundred yards from the Mvua River ford.

Distribution. Originally described from a single specimen from Nangoma Cave, Matumbi near Kilwa, Tanganyika Territory. The present records constitute a considerable extension of its range to the northwest.

Breviceps mossambicus Peters

Breviceps mossambicus Peters, 1855, Arch. Naturg., **21**, part 1, p. 58.

1 (M. C. Z. 13647) Nyange, Uluguru Mtns., 2. x. 26.
1 (M. C. Z. 13648) Mkangazi, Uluguru Mtns., 20. x. 26.

Variation. A third example was taken at Bagilo on 29. ix. 26 and sent to Mr. J. H. Power of Kimberley, who had just brought out 'A Monographic Revision of the Genus Breviceps with Distribution Records and Descriptions of New Species.' It is to be regretted that the author did not make it plainer that it was only the South African records which were considered, no attempt having been made to examine Uganda and East African material or include them in the range of the species.

Of the specimen submitted Mr. Power writes (20. xii. 26): 'The third *Breviceps* is a Central African variety of *B. mossambicus;* it extends northwards from Mashonaland.'

They agree perfectly with the Mozambique and Tanganyika specimens hitherto referred to *mossambicus* by the junior author, nor do they appear to differ from Rhodesian and Transvaal specimens in the Museum of Comparative Zoölogy collection. They certainly agree well with the revised description of the species given by Power. The fourth finger is .62 and .5 times as long as the second in the two examples listed above, which thus fall under *mossambicus* in Mr. Power's key.

Coloration in life. Above, reddish-brown mottled with black; head black, upper surfaces of limbs black; lips pure white, connected by white bars with eyes; a

broad black bar connects eye with lower jaw; this bar is edged with white posteriorly and then a tinge of reddish-orange. Below, chin and throat to an almost straight line across between fore arms, blackish-brown; half-a-dozen small white spots on lower jaw; under sides of all limbs, breast and belly white, with a very few brown blotches.

Variations. Skin smooth, fine pits visible by magnification; rugose and wrinkled on head and posteriorly.

Measurements. ♂ 22 mm., ♀ 40 mm.

Breeding. Ova in the ♀ moderately developed (2 mm. diameter) at Nyange on 2. x. 26.

Diet. (i) Staphylinid and coccinelid beetles; large black and smaller ants. (ii) Ants and termites' heads.

Breviceps spp.

Toads of this genus in the Uluguru and Usambara Mountains present many difficulties in the way of classification; before proceeding to discuss these an outline of the position may be helpful.

Tornier and Nieden referred specimens from Amani, Bulwa and Magrotto in the Eastern Usambaras to *B. verrucosus* Rapp. (1842) from Natal, a species characterized by its porous tubercles and hidden tympanum. In 1910, however, Boulenger placed this species in the synonymy of *B. gibbosus* (Linne) 1758 of no definite type locality. With this decision we agree, and it is apparently followed by Power in his recent paper on the genus, for he omits the species after remarking that Boulenger had placed it in the synonymy.

In investigating the matter we had occasion to consult two specimens in the collection sent to us as *B. gibbosus* by the Berlin and South African Museum respectively. These are:

11620 Port Natal, Wucherer leg. Exch. Berlin Museum.
11789 Port St. Johns, Pondoland. Exch. S. Afr. Museum.

When Power's revision appeared the data of No. 11620 were sent to Mr. Power, who replied that from its locality the specimen must be either *B. rugosus* or *B. mossambicus*. It is obviously not the latter, while the absence of a tympanum and the presence of porous tubercles preclude the idea of it being the former. According to Mr. Power's key to the genus and its double-chinned physiognomy as shown on his Plate XXXIX, fig. 4, and the illustration on Plate XLI, fig. c, ♀, it must be *B. gibbosus*.

The second specimen, No. 11789, is 45 mm. long as against the 50 mm. of the first, with which it agrees in the absence of a tympanum and the presence of porous tubercles all over its distinctly granular skin. It is also double-chinned, but the profile is not quite so flattened anteriorly as in the drawing. It is to be noted that the only species from Port St. Johns, listed by Power, is *B. parvus* Hewitt, a species allied to *mossambicus* and of which we have topotypes.

We conclude therefore that these specimens were correctly identified by the Berlin and South African Museums as *B. gibbosus* and that it is not confined to the Cape Peninsula, as stated by Power, but occurs right across South Africa to Natal. If Power agreed to placing *verrucosus* in the synonymy of *gibbosus* then he should have been aware of this, for Rapp's type was collected in Natal by Krauss.

Breviceps uluguruensis Loveridge

Breviceps uluguruensis Loveridge, 1925, Proc. Zoöl. Soc. London, p. 789, Pl. I, fig. 3.

55 (M. C. Z. 13661–85) Nyingwa, Uluguru Mtns., x. 26.

Kimbofa in Kikami.

Relations. In his paper on the genus *Breviceps*, referred to under *B. mossambicus* and in the preceding remarks, Mr. J. H. Power says, 'in a paper read before the Zoölogical Society of London, on 21st April 1925, Mr. Loveridge describes another new species which he calls *Breviceps uluguruensis*,' and then, without examining the specimen, or adducing reasons for his opinion, dismisses it with these words: 'From the description and figure of this specimen, taken in the Uluguru Mountains, Tanganyika Territory, it is clearly not a member of the genus *Breviceps*.'

A reëxamination of the type shows that it conforms with the published description in every detail; the figure is also a very accurate presentation of its appearance. Several visiting herpetologists, including Drs. Noble and Schmidt, have examined the specimen, which they agree is so obviously a *Breviceps* that it is difficult to see how anyone could suppose anything to the contrary.

It was one of the hopes of the collector to obtain such a series of the creature as to set the matter at rest. *Breviceps* are by no means abundant at Bagilo but a series of fifteen was secured, ranging in size from 18 to 45 mm. It was then observed that the tympanum was concealed only on one side of the head in the two 18 mm., one 27 mm. and a 39 mm. toad. It is lacking on both sides of the 27 mm. type. The Bagilo series is therefore referred to the next species.

On arrival at Nyingwa the junior author was at once struck by the smaller size and frequently lighter colour of the *Breviceps* there. Examination

showed that there was no trace of a tympanum in any one of the long series collected.

A specimen was sent to Mr. Power from the field and he replied: 'The little *Breviceps* which you send from Nyingwa is more like your figure and description of *B. uluguruensis* but differs therefrom in some respects, principally in the presence of a metatarsal tubercle.'

Variations. It may be remembered that the type was described as having 'no shovel-shaped inner metatarsal tubercle,' and it was suggested that its absence might be due to infestation by larval ticks, the 'heels' being very swollen. The inner and outer metatarsal tubercles are hardly noticeable in specimens under 25 mm.; they apparently develop more rapidly as the creature becomes adult; but in the largest the inner is only a swollen pad 3 mm. in length, the outer insignificant.

The limbs in some cases are even shorter than in the type, the metatarsal tubercle reaching only as far as the fore arm in some, though usually to the tympanic region, while in males it may reach the eye.

The second finger, described as 'slightly shorter than the fourth' equals the fourth as frequently as it falls short.

There is a great deal of variation as to the skin: in the majority perhaps it might be described as smooth; in others it is as rugose as in the following species. Fine pits, presumably the glandular orifices, may be observed in some.

With the exception of these slight variations the series agrees well with the type.

Coloration. Some were cream coloured, others an almost terra-cotta hue. In both these types the dorsal colouring was sharply marked off from the purplish hue of the sides and belly. The indistinct reddish lateral streak of the type is a remnant of a terra-cotta upper surface which has been impinged with purplish.

Measurements. Largest toad, a ♀, measured 43 mm. The twelve largest females measured 38 to 43 mm., with an average of 40 mm. Probably the males do not exceed 30 mm. in length; all above that length examined proved to be females. Smallest toad 16 mm.

Breeding. On October 15th, 1926, Salimu secured a ♀, 42 mm. in length (M. C. Z. No. 13661), in a burrow with twenty eggs. Each egg is creamy white and measures 4 mm. in diameter, but is surrounded by a transparent ball of jelly whose outside diameter measures 5.5 mm. It may be observed that there are more 4-mm.-diameter eggs within the mother.

Diet. (i) Termites, ants, woodlice. (ii) Millipede and beetles. (iii) Tick. (iv) Caterpillar and beetle larva.

Distribution. It is curious that no more examples of this toad were secured at Bagilo on the present expedition. Perhaps it occurs only on the mountain tops (6,000 feet) at Bagilo, while most of our collecting was done at lower levels.

Breviceps rugosus Power

Breviceps rugosus Power, Ann. S. Afr. Mus. Cape Town, 20, part 6, p. 467, Pl. XLII, figs. 8–9.

15 (M. C. Z. 13686–95) Bagilo, Uluguru Mtns., ix. 26.
1 (M. C. Z. 13696) Nyange, Uluguru Mtns., 4. x. 26.
27 (M. C. Z. 13697–710) Vituri, Uluguru Mtns., x. 26.

Kimbofa in Kikami.

Relations. This frog is so similar to *B. uluguruensis* in appearance, and frequently in colour also, that it is a matter of the greatest difficulty to separate it from *B. uluguruensis* except by the presence of a tympanum, which, as already remarked, is concealed on one side of the head in four examples of the Bagilo series.

A Nyange adult was sent to Mr. Power by the junior author, when at Nyange. Mr. Power replied on 20. xii. 26: 'It agrees with my *B. rugosus* (see Ann. S. Afr. Mus., Vol. 20, pt. 6, p. 467). I have posted you a copy to the M. C. Z. It is very interesting to know that the species occurs so far north.' As we have no specimens of *rugosus* with which to compare our examples, we accept Mr. Power's determination.

Variation. They agree in most points with the author's description, which was based on a very small series. The fourth finger, stated to be two-thirds to three-fourths the length of the second in the type series, is longer than the second in eleven of the Bagilo toads, equal to the second in three others, and shorter in only one.

In the Bagilo series the snout is contained 5.2 to 8.2 times in the body length as against 5.9 to 6.6 times in *rugosus*.

In the Bagilo series the eye is contained 8.5 to 11.5 (average 9.8) times in the body length as against 11 to 13 times in *rugosus*.

The metatarsal tubercle reaches the eye or end of snout except in young (18 mm.), when it reaches only the tympanic region.

The outer toe in adults seems proportionately much the same in its relation to the inner toe as is the case in *uluguruensis*, where it is only slightly longer in the young, more markedly so in the adults.

In both species the inner metatarsal tubercle is very small in young toads and develops in adults to the somewhat flattened pebble-like form.

Coloration in life. Both sexes are uniformly purplish-brown above. Below, lighter, often pinkish, frequently with purplish-brown markings which may be concentrated on the throat till it appears white-dotted, or even to the exclusion of all lighter colour.

Measurements. Largest toads, Bagilo and Nyange, ♀ ♀, measure 46 mm. each; largest Vituri ♀ measures 45 mm. The twelve largest females in the above series measure 38 to 46 mm., with an average of 43 mm. The largest male measured was 34 mm., from Bagilo. The smallest toads, measuring 18 mm. each, were taken at Bagilo on 20 and 21. ix. 26.

Breeding. The six largest females, taken at Bagilo 9–30. ix. 26, each held many cream-coloured eggs measuring 5 mm. in diameter. The Nyange and Vituri females were in much the same condition. One female, taken in its burrow at Vituri on 29. x. 26, was guarding 35 eggs. The undeveloped cream centres measured 4 to 5 mm. in diameter, or 6 mm. outside the protective coat of transparent jelly. A few eggs, round or oblong, were evidently unfertilized, as they measured only 1 mm. in diameter and were opaquely white.

Diet. (i) Two species of carabids, one weevil and orthopteran remains. (ii) Beetles and millipede remains. (iii) Beetles. (iv) Beetles and what appears to be a freshwater shrimp. (v) Beetles, ant, cockroach, minute larvae. The above list probably gives a wrong impression of this toad's diet. The stomachs were filled with broken insect remains, but only hard parts such as beetle elytra could be easily recognized; many soft-bodied insects would be passed over.

Defence. This species exudes a very sticky secretion. See Folklore.

Parasites. Nematode worms were found in Bagilo and Nyange toads.

Enemies. One was recovered from the stomach of a snake (*Crotaphopeltis hotamboeia tornieri*) at Bagilo and another at Nyange.

Distribution. The type was described from Mariannhill, Natal, and paratypes from Umbilo, Natal and Maxambuli, Transkei. The extension of range to the Uluguru Mountains is remarkable.

Habitat. The series was collected under moss-grown logs or beneath leaves in the rain-forest. One was taken in decayed and shredded wood in the base of a hollow tree, and one or two under stones. After rain they sometimes emerge from their retreats and hop about the forest floor.

Folklore. The Wakami state that any of the sticky *Breviceps* causes a sick or diseased condition of the throat when swallowed by fowls. If a fowl eats several

it loses its voice, gasps, and is unable to swallow and quickly dies without treatment. The treatment adopted is to stir ground maize corn in water and then force it down the fowl's throat; this breaks up and carries away the gummy jelly obstructing the gullet and generally succeeds in bringing about the fowl's recovery.

Breviceps usambaricus sp. n.

Breviceps verrucosus Tornier (not of Rapp) 1897, 'Die Kriechthiere Deutsch-Ost-Afrikas,' p. 160 (Buloa). Nieden, 1910, S. B. Ges. Naturf. Berlin, p. 449 (Amani); 1915, Mitt. Zoöl. Mus. Berlin, p. 380 (Magrotto).

100 (M. C. Z. 13711–35) Amani, Usambara Mtns., xi. 26.
5 (M. C. Z. 13761–65) Mt. Lutindi, Usambara Mtns., 10. xii. 26.

Kikolwe in Kisumbara.

Type. No. 13761, Museum of Comparative Zoölogy. An adult female taken on the forest outskirts within a mile of the Research Institute, Amani, Usambara Mountains, Tanganyika Territory. Collected by A. Loveridge, November 19th, 1926.

Relations. If the last-mentioned species be correctly identified as *B. rugosus* Power, then the present one is in all probability a larger race occurring at lower altitudes, the position being, so far as our present knowledge goes, as follows.

B. uluguruensis, a small toad occurring from 8,000 to 6,000 feet, in a cold and largely sunless habitat where insect life is comparatively scarce.

B. rugosus, a medium-sized toad found from 6,000 to 3,000 feet, where the rain-forest is less cloud-enveloped and consequently has more sunshine and more abundant insect life.

B. usambaricus, the largest known species of the genus, inhabiting the Usambara range at an altitude of from 4,000 to 3,000 feet, being scarce at 4,000. Its size is doubtless due to the sunny, yet moist and genial, climate of Amani, with its teeming insect life.

Diagnosis. The following diagnosis of the three species may be found useful, though not for separating the young of *rugosus* and *usambaricus*.

Tympanum absent. Twelve largest females range from 38 to 43 mm., with an average of 40.25 mm. Metatarsal tubercle of adpressed hind limb reaches from the fore limb to tympanic region (rarely as far as eye) ..... *uluguruensis*
Tympanum present. Twelve largest females range from 38 to 46 mm., with an average of 43.16 mm. Metatarsal tubercle of adpressed hind limb reaches to eye or end of snout (only to the tympanic region in very young specimens) ..... *rugosus*
Tympanum present. Twelve largest females range from 56 to 65 mm., with an average of 59 mm. Metatarsal tubercle of adpressed hind limb reaches to eye (rarely tympanic region, sometimes to snout) ..... *usambaricus*

The tibia into body length of the 36 specimens is of no assistance in diagnosis, being

2.7 to 3.8 times, with average 2.96	*ulugurucnsis*
2.3 to 2.8 times, with average 2.6	*rugosus*
2.5 to 3 times, with average 2.77	*usambaricus*

Neither are the proportionate characters which Mr. Power found useful of much assistance. The snout is measured as from an imaginary line connecting the posterior corners of the eyes, as used in his keys.

Snout is contained in body length 6 to 6.5 times	*ulugurucnsis*
Snout is contained in body length 5.2 to 8.2 times	*rugosus*
Snout is contained in body length 6.1 to 8.4 times	*usambaricus*
Eye is contained in body length 9 to 11 times	*ulugurucnsis*
Eye is contained in body length 9 to 11.5 times	*rugosus*
Eye is contained in body length 9 to 15 times	*usambaricus*

For purposes of description the twenty-four registered paratypes were critically examined; these ranged in size from 29 to 60 mm.

Description. Habit short and stout (65 mm. long by 46 mm. broad); head small; snout projecting, fairly prominent, 8.1 (6.1 to 8.4 in registered paratype series) times into body length, projecting beyond the lower lip, which is nearly vertical. Eye small, diameter 11 times into body length (9 to 15 times in paratype series); interorbital width one and a third times the width of the upper eyelid. Tympanum distinct but ill defined (round and well defined in some paratypes, very difficult to distinguish in young), sub-circular, its diameter about two-thirds that of the eye-opening. Fingers and toes moderately slender, bluntly rounded at the tips; a series of pads beneath the fingers and toes; a very small tubercle at each articulation of fingers and toes. Palms of hands with larger blister-like folds; soles of feet with small, rounded, rather indistinct granules. Fourth finger minutely longer than second (equal to or slightly shorter in paratypes); fifth toe longer than first. A large (4 mm.) pebble-like inner metatarsal tubercle; outer metatarsal flat, inconspicuous, separated from inner. The tarsal tubercle of the adpressed hind limb reaches the eye (also in 20 of 25 paratypes examined, the tympanic region in No. 13717, the nostril in Nos. 13723, 13724 and 13729). Skin above, rugose or granular (rarely almost smooth); below, smooth, except edges of chin and soles of feet, which have numerous scattered granules.

Coloration in alcohol. Uniformly purplish above and on throat. Below, lighter, variegated with brown and purplish-brown; some light spots on the purplish throat.

Measurements.

Tyye ♀.	Snout to vent	65 mm.		Diameter of tympanum	3 mm.
	Length of head	15 "		Length of tibia	22 "
	Breadth of head	20 "		Length of foot	30 "
	Diameter of orbit	5.5 "			

Breeding. The species evidently breeds at Amani during the November 'small rains,' as six of the paratype females examined held eggs ranging in size from 4 to 5 mm. It is to be regretted that no eggs were found in burrows.

Diet. (i) Ant and beetle. (ii) Ants and beetles. (iii) Ants and beetles. (iv) Two beetles and indeterminate matter.

Habitat. Very common under logs at Amani, even on exposed hillsides from which the forest had been cleared many years. Scarce at Mt. Lutindi, where conditions were much drier than at Amani.

Hoplophryne gen. nov.

Genotype. No. 13766. Museum of Comparative Zoölogy.

Diagnosis. Distinguished from all other African brevicipitids by the reduced thumb.

Description. Clavicle represented by a minute moon-shaped nodule just mesial of the acromion process in genotype *uluguruensis* (or absent in *rogersi*); procoracoids present as a thin cartilaginous bar in both sexes of *uluguruensis* (or absent in *rogersi*); omosternum reduced to a mere cartilaginous nodule; coracoids well developed, bony, united by cartilage on the median line; a small, cartilaginous, expanded metasternum. Sacral diapophyses are very well dilated. Terminal phalanges T-shaped.

Pupil round. Tongue oval, entire and free behind; choanae large, widely separated. Tympanum absent.

Parallel Development in Ranidae. This frog and its interesting ally from the Usambara range have their nearest counterpart in external characters in the three Cameroon frogs of the genus *Leptodactylodon*. The only species which we have for comparison is *L. ovatus* from Lolodorf, Cameroon. In this latter frog there are four fingers and a swelling indicating a prepollex; on the prepollex are four (or five) sharp thorn-like spines, while on the first finger there are four (sometimes five) more. In a crescent-shaped band across the chest from axilla to axilla is a series of small spines, while there seem to be faint indications of minute spines on the tibia. The under side is marbled very much in the same manner that the under side of *H. rogersi* is vermiculated. These characters in Hoplophryne are discussed below.

Leptodactylon, however, has two series of large and prominent vomerine teeth, while Hoplophryne has none.

Hoplophryne uluguruensis sp. n.

Plate 2, Figs. 3 and 4

26 (M. C. Z. 13766–789) Nyange, Uluguru Mtns., 5. x. 26.
Eggs and tadpoles (M. C. Z. 13790–795) Nyange, Uluguru Mtns., 5 and 19. x. 26.
2 (M. C. Z. 13796–797) Bagilo, Uluguru Mtns., 26. ix. 26.
5 (M. C. Z. 1379S–802) Nyingwa, Uluguru Mtns., 18. x. 26.
Eggs and tadpoles (M. C. Z. 13803) Nyingwa, Uluguru Mtns., 18. x. 26.
9 (M. C. Z. 13804–812) Vituri, Uluguru Mtns., 28–30. x. 26.
Tadpoles (M. C. Z. 13813) Vituri, Uluguru Mtns., 29. x. 26.

Type. No. 13766. Museum of Comparative Zoölogy. An adult male collected in a wild banana at the top of Mt. Mbova (local name) above Nyange, Uluguru Mountains, Tanganyika Territory. Collected by A. Loveridge, October 5th, 1926.

Description. Habit moderately stout. Head moderately small, snout subacuminate, mouth normal, extending backwards beyond a vertical line from the posterior border of the eye; interorbital space taken in a line between the middle of the upper eyelids, three times the width of the upper eyelid, anteriorly a little more than twice; arms (in death) permanently bent inwards close to breast, position of first finger indicated only by a swelling, second a little shorter than fourth, a little more than half as long as the third, all *three fingers* unwebbed, broadened at the tips without actual disks; five toes, well developed, entirely free of webbing; 1st about half the length of 2nd, which is half the length of the 3rd; 3rd a trifle longer than 5th, 4th much longer than the rest; a very small, flat, ill-defined, inconspicuous, inner metatarsal tubercle; hind limb well developed; the tibio-tarsal articulation of the adpressed hind limb just reaches the posterior border of the eye.

Skin perfectly smooth above and below but covered with minute papillary tubercles dorsally; numerous small tubercles border both upper and lower lips, the region between mouth and fore arm as well as the anterior part of the chest. On either side of the chest, and normally hidden by the fore arms, is a rosette of spines with nine points; on the site of the first finger (prepollex region) is a group of three spines, and adjacent to it on the back of the second finger (first functional finger) another group of five spines; on the outer aspect of the tibia and foot is a further armature of spines, about thirty-two on tibia and sixteen on the foot; these characters are sexual, and absent in the female, which has a slightly superficial resemblance to *Arthroleptis xenodactylus* except for the longer limbs and well-developed digits of the latter.

Colour in alcohol. Above, brownish-black with a purplish bloom and indistinct light specks; a concentration of these forms a fine vertebral line, an uninterrupted

irregular light lateral line from eye to knee of hind limb; a dark band, bordered on both sides by lighter, crosses the thigh obliquely and is continued on tibia. Below, grey-brown, spotted with lighter on throat and with whitish vermiculations elsewhere.

Colour in life. Above, black, finely speckled with silvery white, a series along the vertebral line almost confluent giving the appearance of a fine dorsal line; a similar line on each side from snout over eye along the side to hind limb; a black band, light-edged on both sides, obliquely crosses thigh, is continued across tibia and foot (these black bands are not always visible on the limbs as they show only if darker than the body colour); some white dots on the sides of the face are very conspicuous. Below, brownish-black with silvery specklings mostly on chin and throat.

Colour variation. In the large Nyange series there was one individual whose dorsal colouring was bright, pale green with hind limbs of orange-brown; two others were dark olive-green, and yet another a reddish, almost orange, brown; the bulk of the specimens conformed very exactly to the coloration of the type.

Measurements.

Type ♂.	Snout to vent	25 mm.		Length of tibia	12 mm.
	Length of head	7 "		Length of foot	17 "
	Breadth of head	8 "		Length of 4th toe	7 "
	Diameter of orbit	2 "			

The two largest paratype males also measure 25 mm. each, and the largest female (Nyange) 21 mm. The 35 males range from 17 to 25, with an average of 21 mm. The 7 females range from 19 to 21; with an average of 20 mm.

Sex. The sexes may be distinguished when dead by the presence in the males of the spikes on the breast, hands and hind limbs. Five specimens (Nos. 13779–83) which we consider male juveniles (length 17 to 18 mm.) have a hard white spot at the site where the breast rosette appears in the adults. There is no indication of this in the females. In passing, it may be remarked that the spines on the fingers develop before those on the breast.

It should be recorded that these spines were not noticed at the time of capture; those on the breast would naturally be overlooked, but it seems curious that those on the tibia were not seen, though it is quite possible they were overlooked in the shady forest and in the excitement of capture. The frogs were placed in damp bags and carried to camp, where they were chloroformed without being removed from the bags; they were then tipped into a basin of water and left to soak till morning.

In life these frogs are very flat, but swell appreciably when soaked over night in water. It was only on the following morning that the spikes were observed and it was the junior author's impression in the field that they were everted. The senior author suggests that they were buried in mucous. In their natural habitat these frogs are very slippery; and from the position of the spines, and the fact that they occur only in the males, it would seem impossible to escape from the conviction that they were to assist them in embracing the females while spawning.

Breeding. Eggs and tadpoles were found from the 5th of October until my departure from the Uluguru mountains on October 31st.

The frogs were found in wild banana plants (*Musa ensete* or *M. uluguruensis*) growing in ravines near the top of a forest-clad mountain known to the natives as Mbova. Water courses down these steep ravines after rain, but owing to their precipitousness they are unable to hold a stream; the rich, leaf-mould soil, however, retains much moisture. In stripping off the outer leaves of the bananas, one finds quite a quantity of water held between leaf and stem, and it is on the stem or in this water that the frogs have their home. The nature of their habitat is ample explanation of their very flat appearance.

Upon the inner surface of the leaf and on the stem were masses of eggs adhering by means of their jelly coating, the point of their attachment varying from one to two feet above the juncture of leaf and stem; but whether the eggs are constantly submerged in water or not is rather difficult to decide after opening up the leaf. I came to the conclusion that they were not so immersed. While some of these creamy-white eggs were undeveloped on October 5th, others showed the tadpoles curled up within, while others again had already hatched and the tadpoles were swimming in the small amount of fluid retained between the base of the leaf and its junction with the stem.

In making camp at Nyingwa on October 13th, my native assistants cut a good many bamboos with which to build themselves a hut. A clump of bamboos was growing within twenty feet of the hut. The waste material was thrown in a heap on the ground. In one bamboo, freshly split in half, I found a number of eggs on the 16th; in these the tadpoles could be clearly seen. I assumed therefore, and almost certainly incorrectly, that they were laid on or since the evening of the 13th. Some more were found in a bamboo forming part of the hut roof, but of their age nothing could be ascertained and they were dried up when shown to me.

On the 18th a native brought in a 'banana frog' which he said he had found in a wild banana. Bananas were rare, but now that I knew the species occurred at this altitude I started to search the bamboos the same day, and after examining

many scores espied some eggs through a crack in a living bamboo whose stem was slightly split. On cutting this down and opening it up, not only a batch of fresh eggs was found, but the parent frog, a 19 mm. female. Her depressed habit had permitted her to get through the crack into the bamboo. Further search resulted in the finding of four more adults, but no more eggs.

An egg without its gelatinous capsule measures from 3 to 4 mm. in diameter, and about 5 mm. with the capsule. These eggs are deposited only one deep on the stem of the banana, but more or less clumped. Usually what was apparently the laying of one frog was not laid in a single patch but in several adjacent groups. In the case of the Nyingwa eggs (No. 13803), laid on the inner surface of a bamboo stem, there are two clumps separated by a space of 15 mm., besides a single egg, the total number of eggs laid being twenty-eight.

The developing tadpoles within the eggs are creamy white, with colourless tails; they noticeably assume darker pigmentation only about a fortnight after hatching. As they hatch they wriggle violently on the moist and polished surface of the banana stem and go sliding down it till they reach the water retained between stem and leaf. Doubtless their progress is often assisted by the frequent showers of rain. They undergo their metamorphoses in the seclusion of this private swimming pool, nourished by the remains of many small insects that are drowned in the fluid.[1]

Description of tadpole. (No. 13795.) Length of body twice the width, and one fifth the length, of the tail. A pigmented spot marks the site of the external nares; eyes on the upper surface of the head, the distance between them twice as great as that between the pigmented spots, greater than the width of the mouth. Mouth opening forward, upper lip arcuate, lower lip folded, a median groove and two lateral flaps most conspicuous. Over each branchial region is a peculiar flap, the function of which, at present, is unknown. Spiraculum on the lower surface somewhat nearer the snout than the anus. Not visible from above. Anus median, opening on the lower surface of the subcaudal crest. Tail three and a half times as long as deep, bluntly pointed.

Total length of fully developed tadpole	15 mm.
Tip of nose to vent, about	5 "

Diet. (i) Six species of beetles, including two weevils. (ii) Beetle and ants.

Defence. The only two frogs found away from their natural habitat, i.e., those from Bagilo, were so sticky that I lifted one up by merely laying my finger on the back of the frog, which then adhered to my finger.

Parasites. Small red subdermal parasites on belly.

[1] Dr. Noble has found vegetable matter in their stomachs.

Enemies. One frog was recovered from the stomach of a snake (*Geodipsas procterae*) which was captured in vegetable débris at the very foot of the banana plant inhabited by the frogs.

Distribution. In the Uluguru Mountains from 3,000 to 7,500 feet.

Habitat. In wild bananas (see note above on breeding) and bamboos. Two frogs were taken under logs on a hillside in the rain-forest, at a spot about halfway down the mountain on the Morogoro-Bagilo path, perhaps fifty feet on the left side of the said path as you descend. Both were taken within a radius of ten feet.

The only batrachians found sharing their retreat in the bamboos were two immature *Nectophrynoides tornieri* (Roux).

Hoplophryne rogersi sp. n.[1]

Plate 2, Fig. 5.

4 (M. C. Z. 13814–6) Amani, Usambara Mtns., 20–30. xi. 26.

Type. No. 13814. Museum of Comparative Zoölogy. An adult male collected in a wild banana in the rain-forest on Mt. Bomoli near the Institute of Amani, Usambara Mountains, Tanganyika Territory. Collected by A. Loveridge, November 20th, 1926.

Paratypes. Above series, all males, of which the unregistered specimen is in the British Museum.

Description. Habit moderately stout. Head moderately small, snout subacuminate, mouth normal, extending backwards beyond a vertical line from the posterior border of the eye; interorbital space taken in a line between the middle of the upper eyelids, a little more than twice the width of the upper eyelid, anteriorly twice; arms somewhat bent inwards but not so markedly as in *uluguruensis*, and not so as to conceal the chest; a stump of a first finger with a needle-like bone (prepollex) projecting from its truncated end. Second finger much reduced, half the length of the third (or less than half the length of third in paratype); all four fingers unwebbed, the 2nd, 3rd, and 4th broadened at the tips without actual disks; well-developed tubercles beneath fingers and toes; five toes well developed, entirely free of webbing; 2nd, 3rd, and 4th broadened into squarish expansions at their tips, 1st very small, much less than half the length of 2nd, 2nd half the length of 3rd, which is a little longer than the 5th, 4th very much the longest; a very small, flat, ill-defined, inconspicuous, inner metatarsal tubercle;

[1] Named after Mr. F. W. Rogers, custodian of the Amani Institute at the time of our visit, whose local knowledge and assistance were a great asset.

hind limb well developed; the tibio-tarsal articulation of the adpressed hind limb just reaches the eye (also in all the paratypes, which are males).

Skin perfectly smooth above and below except for minute spines on the back and larger ones on the lips, throat, and limbs, those on the tibia near the knee being exceptionally large; a large group of spines surrounds the first finger and extends backwards almost to the elbow; a small group of eleven spines on the inner aspect of the fore arm close to its base, a larger group of about forty spines on the chest close to, but separated from, its fellow on the other side.

Colour in alcohol. ♂ Type. Above, greyish to black, with lighter patches on flanks and limbs; several well-defined dark bands on thighs, tibiae and feet. Below, white, handsomely vermiculated with dark brown.

Colour in life. Above, slatey-blue, shading to blue-grey peripherally; a black band, commencing on tip of snout, bounds the upper lip, envelops eye, passes over fore limb and broadens out on the side, narrows again at hind limb and terminates on thigh at knee; two transverse black bands on thighs, two on tibia, one on tibio-tarsal articulation and two on foot, the rest of the upper surface of the limbs being blue-grey. Below, black, beautifully vermiculated with white slightly tinged with blue; the ground colour of fore limbs and thighs brown rather than black; glands on fore arm and breast blue.

Measurements.

Type ♂. Snout to vent	24 mm.	Length of tibia	11 mm.
Length of head	9 "	Length of foot	18 "
Breadth of head	9 "	Length of 4th toe	7.5"
Diameter of orbit	2 "		

The three paratype males measure 26, 25, 24 mm.

Diet. The stomach of the type held a small polydesmid, a wood-louse, two spiders and some ants. That of a paratype, ants.

Parasites. A worm over 50 mm. long was found in the stomach of the type; this worm belongs to the Mermithidae, which are insect parasites, and in all probability was liberated from an insect eaten by the frog.

Distribution. After locating the type in the solitary wild banana on Mt. Bomoli I sent Salimu to scour the surrounding hills for more of these plants, which were formerly common at Amani before being destroyed by the natives, who desired the sites for cultivating domestic bananas. The paratype series were secured by Salimu in bananas on a mountain about two miles east of Amani. So far as at present known the distribution of this frog is restricted to the Eastern range of the Usambara Mountains.

Parhoplophryne gen. nov.

Genotype. No. 13818. Museum of Comparative Zoölogy.

Diagnosis. Differs from *Hoplophryne* by the possession of a well-developed clavicle, simple instead of T-shaped terminal phalanges and well-developed metatarsal tubercles.

Description. Clavicle well developed; procoracoids present; omosternum very much reduced; coracoids well developed, bony, united by cartilage on the median line; a small, cartilaginous expanded metasternum. Sacral diapophyses well dilated. Terminal phalanges simple.

Pupil round. Tongue oval, entire and free behind; choanae large and widely separated. Tympanum absent.

Relations. Presumably the genus from which *Hoplophryne* was derived.

Parhoplophryne usambaricus sp. n.

1 (M. C. Z. 13818) Amani, Usambara Mtns., 30. xi. 26.
Tadpoles, etc. (M. C. Z. 13817) Amani, Usambara Mtns., 3. xii. 26.

Type. No. 13818. Museum of Comparative Zoölogy. An immature female collected in a wild banana in the forested hills to the west of Amani, Usambara Mountains, Tanganyika Territory. Collected by A. Loveridge, November 30th, 1926.

Description. Habit moderately stout. Head small, snout more acuminate than in *H. rogersi*, mouth rather small, extending backwards a little beyond an imaginary vertical line from the middle of the eye; interorbital space, taken in a line between the middle of the upper eyelids, twice the width of the upper eyelid; arms normally placed; four fingers, the 1st shorter than the 2nd, which is half the length of the 3rd and slightly shorter than the 4th, no trace of web, not dilated at the tips, well-developed subarticular tubercles beneath fingers and toes; five toes well developed, entirely free of webbing, 1st very small, about half the length of 2nd, 2nd more than half the length of the 3rd, which projects beyond the 5th, 4th much the longest, no digital expansions; a strongly developed, rounded, almost spade-like, inner metatarsal tubercle, and almost equally strong outer tubercle, two-thirds the length of the inner; hind limb rather short, its tibio-tarsal articulation when adpressed barely reaching the axilla.

Skin perfectly smooth above and below without trace of spinosities, beset, however, with many short rugose folds.

Colour in alcohol. Above, purplish-grey, darker on the flanks, dark purplish blotches on greyish ground of the fore and hind limbs and digits. A white bar, as

in Breviceps, from eye to base of fore limb. Below, white handsomely blotched and spotted with dark brown.

Colour in life. So similar to that of *H. rogersi* that no difference was observed by the junior author in the field.

Measurements.

Type ♀.	Snout to vent	23 mm.		Length of tibia	9 mm.
	Length of head	6 "		Length of foot	14 "
	Breadth of head	7.5 "		Length of 4th toe	6 "
	Diameter of orbit	2 "			

Breeding. As no receptacle was available in which to put the tadpoles and young located in wild bananas on November 30th, when the type was secured together with the type series of *Hoplophryne rogersi*, Salimu returned for them on the 3rd of December.

The series which he brought back consists of approximately four tadpoles with minute hind limbs, five tadpoles with hind limbs, four frogs with long tails but all limbs well developed, two frogs without trace of tail. The last two mentioned are young of *Callulina kreffti*, and it is only presumed (and that with reservation) that the tadpoles are young of *Parhoplophryne;* they may well be those of *H. rogersi.*

By the advanced stage of development of this brood, it may be supposed that the breeding season corresponds to that of *H. uluguruensis*, i.e., that eggs are laid in October, though further investigation may reveal that in these mountain forests where rain falls eleven months in the year (according to native reports), the breeding season may be quite indefinite.

Hemisus marmoratum (Peters)

Engystoma marmoratum Peters, 1855, Arch. Naturg., **21**, part 1, p. 58.

3 (M. C. Z. 13819) Dar es Salaam, 4. xi. 26.
1 (M. C. Z. 13822) Tanga, 15. xi. 26.

Measurements. Largest specimen, a female (Dar es Salaam), measures 30 mm.; the other three frogs, from 27 to 25 mm.

Breeding. The large female held small eggs.

Habitat. The Dar es Salaam frogs were all taken in the bottom of a circular pit ten feet deep, dug in sandy soil. They had probably tumbled into it from one of the numerous tunnels which honeycombed the first foot below the surface of the ground and which had been cut into during the construction of the pit.

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PLATE 1

PLATE 1

1. The Uluguru Mountains from Morogoro.
   Areas of rain-forest occur on crests of peaks and sides of ravines too steep for maize cultivation.

2. Wild bananas (*Ensete musa* or *uluguruensis*) on edge of rain-forests.
   The water retained at the base of the leaves forms the breeding habitat of the new Brevicepitid genera Hoplophryne and Parhoplophryne.

3. Rain-forest at Phillipshof (native name, Magamba).
   Much of the forest has been cleared in the Western Usambara Mountains for grazing land. On the edges of remaining patches of forest, as well as in their open glades, *Chamaeleo fischeri multituberculatus* was abundant.

   (Photo by J. T. Zimmer, reproduced by permission of the Field Museum of Natural History, Chicago, Ill.)

1

2

3

PLATE 2

PLATE 2

1. *Agama colonorum usambarae* subsp. n. ♂ Type.
   Ventral View (M.C.Z. No. 24129).

2. *Prosymna ornatissima* sp. n. ♀ Type.
   (M.C.Z. No. 23271.)

3. *Hoplophryne uluguruensis* gen. et. sp. n. ♂ Type.
   Dorsal View (M.C.Z. No. 13766). × $1\frac{1}{5}$.

4. *Hoplophryne uluguruensis* gen. et. sp. n. ♂ Type.
   Ventral View (M.C.Z. No. 13766). × $1\frac{1}{5}$.

5. *Hoplophryne rogersi* gen. et sp. n. ♂ Type.
   Ventral View (M.C.Z. No. 13814).

6. *Spelaeophryne methneri* Ahl. ♂.
   Lateral View (M.C.Z. No. 13641).

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PLATE 3

PLATE 3

1. *Hyperolius mariae* sp. n. ♀ Type. (M.C.Z. No. 13267.) × 2.
2. *Megalixalus uluguruensis* sp. n. ♀ Type. (M.C.Z. No. 13311.) × 1½.
3. *Leptopelis uluguruensis* sp. n. ♂ Type. (M.C.Z. No. 13586.) × 2.

1

2

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PLATE 4

PLATE 4

1. Egg of *Hemidactylus persimilis* sp. n.
2. Egg of *Hemidactylus mabouia*, to show difference in size.
3. Under surface of left hand of *Hemidactylus persimilis* sp. n. ♂ Type. (M.C.Z. 24041.) × 2.
4. Under surface of left hand of *Hemidactylus mabouia*, to show lamellar differences. (M.C.Z. 24037.) × 2.
5. Upper surface of head of *Scelotes eggeli* Tornier. (M.C.Z. No. 24213.) × 2.
6. Upper surface of head of *Scelotes uluguruensis* sp. n. ♀ Type. (M.C.Z. No. 24204.) × 2.
7. Under surface of left foot of *Phrynobatrachus krefftii* ♂, to show spinosities. (M.C.Z. No. 12741.) × 2.
8. Under surface of left foot of *Phrynobatrachus krefftii* ♀, to show almost entire absence of spinosities. (M.C.Z. No. 12754.) × 2.
9. Upper aspect of right hand of *Leptopelis parkeri* sp. n. ♀ Type. (M.C.Z. No. 13597.) × 3.
10. Upper aspect of right foot of *Leptopelis parkeri* sp. n. ♀ Type. (M.C.Z. No. 13597.) × 3.

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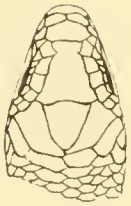

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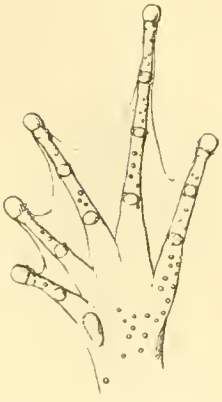

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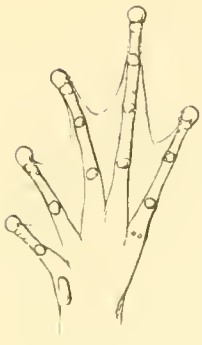

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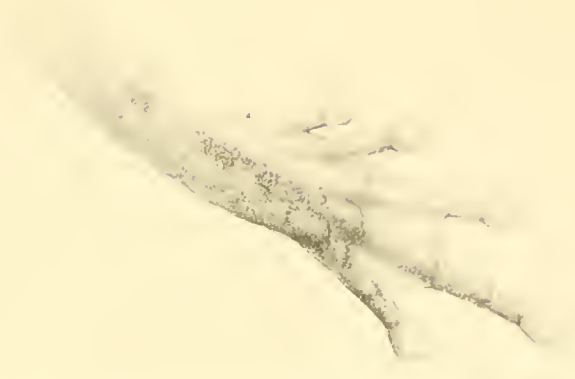

10

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